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POSTWAR PLANNING IN ANESTHESIOLOGY*

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ANESTHESIOLOGY has now established its unequivocal value to the surgical and medical professions, and to those seeking medical care coming under its jurisdiction. The inherent dynamic nature of the specialty with its present broad application was gaining momentum rapidly during the immediate prewar period. Its increasing sphere of application was being affected less and less in those days by specious economic opposition and examples of personal and institutional obstacles. A permanent retardation of its growth because of the temporary remission of its activities in civilian life engendered by the war is therefore not expected. Conversely, its growth may be further stimulated in the postwar period because of its wartime contributions and experiences. Thoughtful guidance and planning for it are indicated, however. The statements and proposals suggested here spring from an attempt to project into the future the trends exhibited by anesthesiology as observed during the past twenty years, coupled with the possible effects of the impact of a sudden peace following total war.

Postwar planning is a vitally important problem at this time. The details of proposals for the management of the initial peace period should, however, as yet remain flexible. This country has survived the period where the major issue of victory or defeat was not clear, but its people are still ignorant of the element of time required for victory, its ultimate cost from numerous angles and the sociologic conditions that will be present thereafter. Many authorities believe that postwar medical practices will undergo a metamorphosis of a type as yet undetermined. Some believe that the very structure of modern medicine may be assailed. If such future attempts at outside control are successful, the younger specialties may be affected first. Those within the specialty should look forward to future progress for many reasons, some of which will be outlined, irrespective of possible future changes in medical practice. It is believed, also, that there will be the continued active support of a growing portion of the medical profession in the future, as now.

The first problem of postwar medical planning naturally concerns the return to civil life of medical men in military service. For anesthesiology, these may be logically and conveniently grouped in three classifications. The first comprises the adequately trained, fully experienced anesthesiologists. Some members of this group were professors in universities and directors of anesthesia in large hospitals, in situations in which they could contribute to both instruction and medical service, according to their qualifications. Without doubt, the greater number of these positions will be awaiting the former incumbents on their return, to the mutual satisfaction of both institutions and teachers. A few may seek new positions for many reasons, and for these replacement will be indicated. A proposed plan for the relocation of these persons will be discussed.

When the present war began, the importance of anesthesiologists was recognized by the armed forces, and courses of instruction for medical officers in both military and civilian hospitals were initiated. In this way, material numbers of men received their basic training in anesthesia. It is the general belief that most of the officers so trained, who comprise the second group, will continue in the specialty after the war; for example, the majority of the men thus trained in Philadelphia expressed such a desire both during training and thereafter. A portion of these officers will have received sufficient additional training or supervised experiences to enable them to practice immediately on discharge. The same will be true of men who had just completed their formal training at the outbreak of the war and immediately entered the Service, with no opportunity for civil practice. This group will also desire aid in suitably locating themselves.

The third group is composed of men who require additional training. A portion of them will consist of those medical officers who were hurriedly and

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incompletely trained for the emergency and were able to provide the needed service in the combat forces, but because of the incomplete nature of their preparation should be discouraged from entering civilian practice without completing their formal training. Plans should be made for sufficient suitable residencies to provide this training. The same is true of those whose interest in anesthesia has been stimulated for the first time by the war, either by observing the efficient application of modern anesthetic practices or witnessing at first hand the effects of its mismanagement in remote corners of the world, or through recognition of the opportunities offered to young physicians by the practice of anesthesiology.

It appears that some medium should be set up for the collection and filing of data concerning opportunities for the returning qualified anesthesiologists.[1] It may be that the American Society of Anesthetists might best serve this purpose. Dr. Paul M. Wood, of New York City, the present chairman of the Professional Relations Committee of the society, has stated that his committee is willing to serve in this capacity. Institutions desiring to establish contact with qualified physicians could file their specific requirements, the opportunities for service offered and the economic features, together with other essential information, with this committee. Discharged officers would then have these data available and be able to locate themselves easily and satisfactorily, with little lost time and effort.

For officers requiring graduate study in anesthesiology, additional training facilities should be provided through increasing the number of available residencies. According to the most recent published statistics, only forty-three vacancies are now offered by existing approved residencies, assistant residencies and fellowships for this type of training.[2] It has been estimated that should the war end by 1945, as many as 20,000 physicians will be released from military service who have never had the opportunity of beginning the private practice of medicine.[3] So many will seek residencies that it is believed that 13,000 residencies will be required, whereas only 5500 are available under normal conditions.[4] By these figures, some idea is conveyed of the proportionate increase of residencies in anesthesiology that may be required.

It seems that the postwar period would be an appropriate time to stimulate training facilities not only in quantity but also in quality. The selection of men for training should be carried out with great care. Since the specialty has expanded its activities, the mental requirements for its application have likewise increased. Residencies that are set up for the mere purpose of providing clinical anesthesia for surgical patients with unqualified or no supervision must be discontinued. A definite plan of instruction in charge of capable and qualified physicians is necessary, and this plan must be consummated efficiently. The clinical work should be under constant adequate supervision. Clinical training should include instruction and experience in *all* types and methods of anesthesia. The days are past when a physician could call himself an anesthesiologist only because of his ability with inhalation agents and technics. It is true that a thorough knowledge of physiology, pharmacology and other basic sciences is required to administer anesthetic agents by inhalation technics with the greatest safety and efficiency, but spinal, intravenous and regional technics are too valuable to be lightly treated or ignored. Gas therapy, — for example, the correct administration of oxygen or of helium, — diagnostic, prognostic and therapeutic nerve blocks and resuscitative procedures are also important aspects of training. Training in bronchoscopic technic for postoperative aspiration of the air passages is quite valuable. In some institutions the management and direction of blood and plasma banks and transfusions are demanded of the Anesthesia Service. Unless the above aspects of anesthesiology are included, residencies in anesthesia can be made a mere sham for the economic welfare only of the institution where they are offered.

From recent personal experience in Philadelphia, I believe that the exchange of senior residents between institutions offering training is invaluable from all aspects. In addition to broadening the experiences of the residents, it facilitates exchanges of ideas, and frequently offers training in aspects of the field not emphasized at the institution where the bulk of instruction and training has been taken. In time, with the establishment of comprehensive foreign residencies, exchange with residents from other countries does not appear to be impossible.

It appears unlikely that the saturation point for trained anesthesiologists will be reached for a long time. Whereas many other specialties are overcrowded, the reverse is true in anesthesia. The ratio of undeveloped locales for its application to the number of trained personnel now available and to be supplied by those returning from the armed forces is impressive. Less than 250 anesthesiologists have been certified by the American Board of Anesthesiology. The membership of the American Society of Anesthetists is approximately 1500. On the other hand, over 7500 hospitals are listed by the American Medical Association either as being approved for internships, residencies, and fellowships or as measuring up to the standards set forth by its Council on Medical Education and Hospitals. This shows a ratio of five hospitals to one present anesthesiologist. Few specialties are able to show the numerical possibilities of such a ratio for every physician majoring in that field and at the same time to offer the same opportunity for as broad an application of it as does anesthesiology. It is granted that each hospital would not be capable of support-

ing one physician anesthetist, and that it would require many years to change over to the status in which all anesthetics would be administered by physicians, even though such a thought might be accepted. On the other hand, it is also true that there are many large hospitals that could utilize the services of a number of physician anesthetists. I believe that a hospital of 125 to 150 beds can support adequately one anesthesiologist, with 100 per cent of his time devoted to anesthesiology.

It is not unlikely that experiences encountered during the present war will greatly increase the opportunity for anesthesiology. Before the war, large numbers of surgeons had never had the experience of operating under conditions provided by the physician anesthetist. Many of them had never attempted to acquire the services of a physician for anesthesia. They could, therefore, through personal experience, have no basis for a comparison of the operating conditions provided by the two types. Many of these surgeons have made or will make their first contacts with competent anesthesiologists in the armed forces and work under the improved conditions provided by them. After such an experience, it is to be seriously doubted whether many of them will be content on their return to civilian practice to retrogress to the inferior type of unsupervised technician anesthesia, where, as the law requires, they must assume full responsibility for the anesthesia, even though fully occupied with the technical requirements of the surgery, and at the same time must dictate treatment and supportive measures during the operative period. On the other hand, there will be numerous surgeons who have long been accustomed to the advantages provided by anesthesiologists who will be exposed to the nonprofessional type of service. It may be assumed that a large portion of this latter group will become even more active in furthering the advance of anesthesiology after the war.

From the viewpoint of war itself, facilities for the training of anesthesiologists should be enlarged. Disturbing though it may be, the possibility of a third world war has already been discussed by reputable international authorities. With this thought in mind, plans should now be laid in order that greater numbers of anesthesiologists may be available than existed at the outbreak of World War II. Recent experiences in the combat areas have indicated that the presence of qualified anesthesiologists at the immediate front under actual fire is quite valuable. Nurses cannot be assigned to such duties, and at the present time there are not sufficient numbers of experienced physicians for this purpose.

Some hospitals, because of the shortage of technician anesthetists, have attempted to locate physician anesthetists during this war period. They quickly learned that the shortage of physicians is more acute than that of technicians. In the postwar period, these same hospitals should be stimulated to seek again the services of physicians. By doing so, they could probably avoid future inadequate anesthesia service. An example may be cited by comparing two large general hospitals in the same city. Hospital A for many years has had physician anesthetists, and, for the last fifteen years, residents in training. Hospital B formerly had only technicians, and placed a qualified anesthesiologist in charge only after the war had begun. Hospital A, although contributing its comparative share of personnel to the war effort, has so far provided adequate anesthesiologic care, partly because physicians usually consent to work longer hours. Also, more work has been placed on the older staff members. Although reduced 50 per cent in number of residents by the Procurement and Assignment Service, it was able to attract some of the military unfit as assistants because it was well established as a training center. Hospital B, with no residents as a standard practice, could, of course, obtain no resident in anesthesiology under Procurement and Assignment Service. A large number of technicians were sent to the armed forces, and because their number could not be expanded, it became necessary to rely on interns with no experience in anesthesia. Since it is impossible for the single anesthesiologist to supervise all the work, the anesthesia service has been markedly impaired. If Hospital B had initiated this service in the prewar period, the Procurement and Assignment Service would have allowed it 50 per cent of its former residents under the 9-9-9 program and the remaining physicians would have worked longer hours with the result that the hospital would have been able to supply its share of trained men for the armed forces and that the civilian population patronizing the hospital would not have suffered anesthesia service of lowered quality.

This discussion will be concluded by a consideration of the economics of the specialty. The transition from fees collected by the hospital for the services of a technician with a short and inexpensive period of training to that of a fair fee for a physician commensurate with his ability and prolonged and expensive training is a difficult one. Attempts have been and will continue to be made to enlist the services of physician anesthetists at full-time salaries at a level only slightly above that allotted for technicians. A great error will be committed if the medical profession allows these attempts to be successful. It is only just that a physician should expect recompense commensurate with his ability and intelligence, his training and the value of service rendered. If anesthesiologists cannot expect a financial return comparable to other specialties, the desirable type of young physician will little desire to enter or remain in the field. It is here, also, that practitioners of the surgical specialties can contribute wisely by their support. It has been

stated[5] that good anesthesia costs more than poor or mediocre anesthesia, but a hospital acquiring the advantages of the modern developments in anesthesia will very soon appreciate that it has been more than repaid for the investment in terms of the patient's satisfaction, mortality and morbidity and the comfort of conscience. It has been estimated that on the average the financial return of the physician anesthetist could be made quite satisfactory by an increase in cost to the patient of only 5 per cent or less of the cost of the *entire* surgical venture, when compared with the cost of similar services by technicians.[6] Few patients with any degree of intelligence would object to this small increase in expenditure if the benefits to be derived were explained to them, preferably by the surgeon. One effective method of management in this aspect that has come to my notice is for the surgeon to adopt the attitude before the patient that he believes his patients engage him because of his skill, and that it is therefore logical that he engage an anesthetist whose ability in anesthesiology is comparable to his in the field of surgery.

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To summarize, postwar planning in anesthesiology should include first an agency or committee to accumulate data on positions for trained anesthesiologists and for residencies available to officers requiring additional training when discharged from military duty. A greater number of residencies should be set up now, to begin functioning at the conclusion of the war. The standards of resident training should in no way be lowered. Institutions now without anesthesiologic services should be stimulated to plan for them in order to provide opportunities for those already trained and to be available in the future for those as yet untrained. If the medical profession in general will stimulate externally the natural inherent tendency within the specialty toward expansion, its accomplishment will serve as another example that the practice of medicine is not deserving of the attempted onslaughts on its present structure.

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THE ABNORMAL PHYSIOLOGY OF CHRONIC PULMONARY EMPHYSEMA*

Three Contrasting Illustrative Cases

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IN RECENT years there has been a change in emphasis in the concept of the pathologic physiology of emphysema. To previous ideas concerning the diminution of pulmonary respiratory surfaces due to changes in the alveoli, the loss of capillaries and an increased diffusion coefficient for the blood gases has been added enlightening information about sundry mechanical inefficiencies of pulmonary ventilation. So much excellent work on normal and abnormal respiratory function has been done by Christie,[1-4] Alexander and Kountz,[5-7] Barach,[8-10] Hurtado,[11,12] Hermannsen,[13] Anthony,[14] Knipping,[15] Cournand[16-20] and others that it would be impossible to cover the material even in brief in a short space. Furthermore, the present interest in problems of high-altitude aviation has greatly enlarged the appreciation of pulmonocirculatory function and dysfunction and of the usefulness of oxygen in a variety of conditions. It is interesting to realize that in emphysema one has in some degree patients who live at "high altitudes" at sea level.

Clinically the term "pulmonary emphysema" is used without sufficient discrimination to include two fairly distinct etiologic types. One of these is the so-called "postural" or "senile" emphysema, which is the more frequent of the two but is relatively seldom of great clinical significance. The more significant type, variously named "chronic hypertrophic" or "obstructive" emphysema, has a somewhat younger age incidence and the etiologic factor of obstruction to breathing is usually fairly prominent on careful inquiry. Christie,[4] who has done a great deal of valuable work in human emphysema, states that in his experience more than 90 per cent of patients with chronic hypertrophic emphysema give a significant history of asthma and chronic bronchitis. Experimentally, a pathologic lung picture similar to that found in human emphysema of this type has been produced in animals by various methods that produce chronic respiratory obstruction.[21] It is intended here to present briefly 3 contrasting cases of chronic hypertrophic emphysema that illustrate several illuminating but frequently overlooked aspects of the disease, together with some unusual observations on the physiologic abnormalities that exist.

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Case Reports

Case 1. J. M., a 38-year-old Scottish bus driver, was admitted to the hospital in great respiratory distress that was the culmination of 6 years' progressive diminution of exercise tolerance. The respiratory history included four or five episodes of pneumonia, three of these in the first 3 years of life, with frequent milder upper respiratory infections interposed. For 6 years the patient had been coughing up as much as a half cupful of yellowish-white sputum a day. For 4 years his exercise tolerance had been almost nil. There had been episodes of dyspnea at night with cough. He had spent the 4 weeks previous to admission sitting in a chair in more or less continuous respiratory distress.

Physical examination revealed an undernourished, middle-aged orthopneic man breathing with prolonged expiratory and inspiratory effort. The accessory muscles of respiration were extensively called into play, the shoulder girdles being fixed by grasping the bed or arms of the chair with both hands. There was infrequent nonproductive cough and marked cyanosis. The chest was strikingly emphysematous in appearance and hyper-resonant, with diminished tactile fremitus, faint breath sounds, a few scattered crackling rales but no rhonchi. The lower extremities were cold and blue, with soft pitting edema of the feet; circulatory studies established this edema as due to dependency of the legs during the 4 weeks of sitting and not to cardiac disease or cardiac failure. Chest films revealed marked emphysema of the lower lobes of the lung, whereas a review of lipiodol studies made 2 years previously showed bronchial irregularities of the type frequently seen in asthma and chronic bronchitis rather than true bronchiectasis. There was a polycythemia with a hemoglobin of 120 per cent and a red-cell count of 6,300,000; the white-cell count was 12,000, with 73 per cent neutrophils and no eosinophils.

After 9 days' stay in the hospital, during which many forms of medication were exhibited, including ephedrine, aminophyllin and adrenalin, the patient returned home essentially unimproved. One week later he was readmitted in worse respiratory difficulty than before, with cough, productive of thick, yellowish-white sputum, and a low-grade elevation of temperature, both of which rapidly subsided. He was more cyanotic, anxious and apprehensive than previously and was often mentally dull and disoriented. The chest, which showed some medium rales on admission, became completely silent within 48 hours, without change in the characteristics of the respiration. That there was no significant cardiac factor was indicated by a normal ptotic heart, an electrocardiogram within normal limits, a circulation time (Decholin) of 15 seconds (normal) and a venous pressure of 35 mm. of water (low normal). The vital capacity on repeated measurement over a period of days was 1000 cc. The arterial blood taken at a time when the patient's condition was stationary but somewhat improved over what it had been at the time of admission showed an arterial oxygen saturation of only 60 per cent (normal, 95 per cent).

Case 2. W.D., a 64-year-old ex-salesman, was admitted with the chief complaint of marked shortness of breath on exertion and chronic productive cough, both of 6 years' progression. There was a long history of repeated respiratory infection, beginning with influenza in 1918 and including two episodes of extreme dyspnea of an hour or more in duration, precipitated by walking unusually far and characterized by paroxysmal cough and orthopnea. The admission was precipitated by a "cold" 2 weeks previously, subsequent to which the exercise tolerance was limited to walking 25 yards slowly on the level.

Physical examination showed a pale, undernourished man with somewhat labored respirations and a cyanotic hue of the lips and nail beds. Respiration involved abnormal muscular effort and showed prolongation of the expiratory phase; on deep inspiration the costal margins moved inward. The chest was hyper-resonant, with diminished cardiac dullness and a low diaphragm showing very poor excursion. The breath sounds were faint, with a prolonged expiratory phase and occasional basal rales. A few scattered sibilant inspiratory and expiratory rhonchi were noted on admission, but within 2 or 3 days these adventitious sounds were no longer heard, although there was no marked symptomatic improvement.

X-ray examination showed marked emphysema of the lungs, with a low diaphragm having less than 1 cm. excursion, and a normal ptotic heart. Lipiodol injection of the left lower main bronchus showed no true bronchiectasis but square endings and minor irregularities in diameter of the bronchioles, "such as is commonly found in asthma and emphysema." A normal electrocardiogram and a circulation time (Decholin) of 16 seconds (normal) supported the x-ray and clinical evidence of cardiac normalcy.

The vital capacity was consistently 1800 cc. The arterial oxygen saturation was 87 per cent (normal, 95 per cent). The carbon dioxide combining power of the plasma was 77 vol. per cent (normal, 50 to 70 vol. per cent). Marked dyspnea resulted from walking slowly 100 feet on the level.

Case 3. H. H., a 51-year-old shoe cutter, was admitted with the complaint of progressive "shortness of wind" of 10 years' duration. He had been an unusually fine athlete, indulging competitively in running, jumping, boxing, wrestling and various other sports up to the age of 40 years, at which time he was still able to outdistance younger men in 100-yard and 200-yard sprints. During the subsequent 5 to 6 years, he cleaned hen houses on one day a week, with severe choking up from the dust and with cough and mucoid sputum for 2 or 3 days each time. During this period he began for the first time to notice unusual exertional dyspnea, which became progressively more marked, so that at the time of admission he was comfortable at rest but became markedly dyspneic on walking 50 yards at ordinary speed on the level, and after a much shorter distance when the weather was extremely cold. The only respiratory infective history elicited was that of "pneumonia" with hemoptysis after a thoracic injury at the age of 14, morning cough productive of thick yellow sputum for 7 years previous to admission and "influenza" with equivocal hemoptysis 8 months previous to admission.

Physical examination revealed a rather thin, well-developed, relatively young-looking man. The thorax was moderately emphysematous in appearance with an increased anteroposterior diameter, and there was loss of cardiac dullness and a low diaphragm of subnormal excursion. The breath sounds were distant, and there were fine to medium rales in both lung bases but no rhonchi. Chest films revealed marked emphysema, particularly in the lung bases. Lipiodol instilled into the right bronchial tree showed multiple diffuse areas of bronchiectasis in the right base anteriorly, the bronchi near the hilum appearing to be normal. There was a mild polycythemia, with the red-cell count 5,600,000, the hemoglobin 16.6 gm. and the hematocrit 49 per cent; the white-cell count was 7900, with 73 per cent neutrophils, 24 per cent lymphocytes and 3 per cent monocytes. There was no cardiac enlargement. The electrocardiogram showed slight right-axis deviation but was within the limits of normal. The circulation time (Decholin) was 13 seconds (normal).

The vital capacity, to the amazement of many, was consistently 4200 cc. The oxygen saturation of the arterial blood was 89 per cent (normal, 95 per cent).

* * *

It is at once evident that these 3 cases, which have in common extreme restriction in exercise tolerance, vary markedly in history and in various physical factors. J. M. (Case 1), with a vital capacity of 1000 cc. and an arterial oxygen saturation of 60 per cent, was orthopneic, but not extremely so when not excited. W. D. (Case 2), with a vital capacity of only 1800 cc. and an arterial oxygen saturation of 87 per cent, was not much more restricted in activity than was H. H. (Case 3), who had a vital capacity of 4200 cc. and an oxygen saturation of 89 per cent.

Vital Capacity in Emphysema

In considering Cases 2 and 3, with vital capacities of 1800 cc. and 4200 cc., respectively, yet similarly restricted exercise tolerance, one might conclude at first glance that the patient in Case 3 must have had a much greater impermeability of the respiratory

epithelium or some much more marked defect of the pulmonary capillary network than did the patient in Case 2 to account for this startling incongruity. Such a conclusion is not justified. By making a kymographic tracing of the vital-capacity measurement a serious fault in the usual method of vital capacity measurement was exposed. In Figure 1, three of the solid lines show the vital-capacity

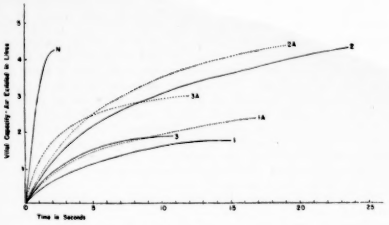

FIGURE 1. *Vital-Capacity Exhalation-Time Curves.*

These were determined by kymographically recording the volume of air per second exhaled into the spirometer during the measurement of the vital capacity. The solid lines represent measurements made before adrenalin inhalation, and the interrupted lines those made after adrenalin inhalation.

N *represents the characteristic tracing obtained from a normal subject;* 1 *and* 1A, *the tracings obtained in Case* 2; 2 *and* 2A, *the tracings obtained in Case* 3; *and* 3 *and* 3A, *the tracings obtained with Patient J. A., whose case is not presented in the text but who had moderate emphysema and a silent chest and a twenty-year history of mild asthma.*

measurements of a normal subject and of Cases 2 and 3 as recorded kymographically. It is strikingly apparent that whereas the patient in Case 3 had a normal vital capacity, it required twenty seconds for him to exhale the same amount of air as was exhaled by the normal subject in one and a half seconds with ease. To illustrate the significance of this time factor, let it be supposed that the respiratory rate of both patients was 20, with three seconds per complete respiratory cycle and only one and a half seconds for the expiratory phase. It then becomes apparent that in this one and a half seconds the normal subject could exhale (and inhale) 4 liters of air if necessary, whereas the patient in Case 3 could exhale only some 900 cc. in the same period of time, and this with maximum effort. Although the latter had a vital capacity of 4200 cc., only a small fraction of this was available in the carrying out of any respiratory function; the cause of his marked limitation of exercise tolerance in spite of a quantitatively normal vital capacity can be logically explained on the basis of mechanical inability to ventilate the lungs. The kymographic tracings also illustrate the basic soundness of an old test for emphysema — that of inability to blow out a candle flame. In Case 2 the respiratory ventilating capacity was even less than in Case 3, a finding in keeping with the somewhat greater limitation in exercise tolerance.

Bronchial Spasm in Emphysema

The severest case (Case 1) was unusually instructive from the point of view of the bronchial obstructive factor in emphysema. In the records of many visits to the Out Patient Department, admissions to the hospital and so forth, it was noted that almost always when the patient was examined physically there was no indication of any infective process in the lungs or of any asthmatic state. Yet a careful history did reveal a formidable pulmonary infective prologue and did disclose indications of a possible bronchospastic factor — the paroxysmal nature of the dyspnea, its precipitation by emotion, the occasional presence of expiratory squeaks and groans and the relief of dyspnea for several months after an attack of pneumococcal pneumonia.

The actual presence of a bronchospastic factor was strikingly demonstrated when, immediately after physical examination had confirmed the absence of adventitious sounds in the chest, the administration of a few minims of a 1:100 solution of adrenalin by inhaled nebula resulted in a rise in vital capacity from 1300 to 2700 cc. within seven minutes (Table 1); this marked effect of adrenalin

TABLE 1. *Effect of Adrenalin on Vital Capacity.*

Case No.	Type of Medication	Vital Capacity Before Medication	Vital Capacity After Medication
		cc.	*cc.*
1	Adrenalin (1:1000), hypodermically	1000	2400 (20 min. later)
	Adrenalin (1:100), by nebula	1300	2700 (7 min. later)
	Adrenalin in oil, hypodermically		2300 (maintained)
2	Adrenalin (1:100), by nebula	1800	2500
3	Adrenalin (1:100), by nebula	4200	4200

was confirmed on another occasion by giving 0.5 cc. of a 1:1000 solution of adrenalin hypodermically. Adrenalin in oil, 1 cc. every eight hours, was found to maintain the vital capacity at about 2300 cc. These results emphasized several important points — first, that marked bronchospasm could exist in the complete absence of adventitious sounds in the chest; second, that the effect of adrenalin in these cases should be measured *objectively*, for in this case adrenalin in various forms had been given on many occasions previously with neither patient nor physician satisfied that it had any beneficial effect; and third, that adrenalin by nebula, when effective and free of contraindicating side effects, is one of the few valuable and readily applicable therapeutic measures in the treatment of emphysema. In Case 2, also, adrenalin by nebula increased the vital capacity from 1800 to 2500 cc. and proved of considerable value in subsequent treatment. In Case 3, on the other hand, the patient, who had a vital capacity of 4200 cc., on admission showed no marked change with adrenalin by nebula. The effectiveness of adrenalin by nebula in raising the kymographic

vital capacity tracing in another emphysema patient (J. A.) is illustrated in Figure 1.

Adaptive Changes in Emphysema

Are such emphysematous patients when at rest and free of dyspnea physiologically normal? The negative answer to this question is seen in the analyses of alveolar air and of arterial blood. In Table 2 is illustrated the fact that the alveolar air at rest and in absence of dyspnea contains significantly more carbon dioxide and less oxygen than the normal. Similarly the arterial blood studies in Table 3 reveal lower oxygen saturation values and higher carbon dioxide contents than the normal. In a normal subject such carbon dioxide and oxygen values would cause hyperpnea and perhaps dyspnea; indeed, an arterial saturation of 60 per cent as was present in Case 1 at a time when the patient was not greatly dyspneic would hardly be compatible with consciousness. It is apparent that in emphysematous patients the abnormal mechanical difficulties of respiration result even at rest in subnormal pulmonary ventilation and in varying degrees of adaptation to the changes in physiology that result. The polycythemia seen in Cases 1 and 3 is an adaptation to subnormal alveolar oxygen tensions that parallels closely that which occurs in persons acclimatized to mountain altitudes.[23]

To carry the matter of adaptation further in Case 1 brings up another frequently overlooked fact. The arterial oxygen saturation value of 60 per cent corresponds roughly to that which would occur in an unacclimatized person at an altitude of 22,000 feet,[24] an altitude 8000 to 10,000 feet above that which ordinarily causes the symptoms of mountain sickness and one which would result in loss of consciousness in a period of minutes or hours and probably in death. One should realize, therefore, that the headache, giddiness, loss of appetite with inability to eat due to quickly developing nausea, diminished acuity of hearing, weakness, tiredness, insomnia, muscular weakness and tremor, tachycardia, cyanosis and, at times, episodes of disorientation that occur in such patients are the symptoms of mountain sickness and are largely to be attributed to anoxia. They are relieved by oxygen therapy and should not be attributed to constipation. They are mitigated to some degree by an increase in the oxygen-carrying power of the blood, as seen in Case 1.

Table 2. *The Composition of Alveolar (?) Air in Emphysematous and Normal Persons.*

Source	Oxygen content %	Oxygen calculated partial pressure mm.	Carbon Dioxide content %	Carbon Dioxide calculated partial pressure mm.
Normal	14.5	100-105	5.5	38-40
Emphysema (Roelson[22])	11-13	78-93	5-7	36-50
Emphysema (Meakins and Dautrebande, from Roelson[22])	10.42	74	8.59	61
	9.98	71	9.01	64
	12.80	91	6.20	44
Emphysema (Case 1)	9.87	70	7.77	55
Emphysema (Case 2)	12.18	87	7.16	51
Emphysema (Case 3)	10.81	77	5.75	41

Cause of Dyspnea on Mild Exertion

In Table 3 are tabulated analyses of the arterial blood for several cases of emphysema before (at rest) and immediately after mild exercise sufficient to cause only moderate dyspnea. The observations are not sufficient in number to be conclusive but do suggest several interesting points. It will be noted that in most cases the oxygen saturation of the blood was higher and the carbon dioxide content lower during dyspnea than at rest; that is, the blood appeared actually more normal in these two factors during the dyspnea of mild exercise than at rest. The arterial blood lactic acid values were somewhat high at rest and showed a greater elevation after exercise than would be shown by a normal person doing the same amount of work. The pH changes were also greater than would be expected.

Table 3. *Arterial Blood Studies Before and Immediately After Mild Exercise (Moderate Dyspnea).*

Case No. or Patient	Oxygen Saturation Before Exercise %	Oxygen Saturation After Exercise %	Carbon Dioxide Content Before Exercise vol. %	Carbon Dioxide Content After Exercise vol. %	Lactic Acid‡ Before Exercise mg./100cc.	Lactic Acid‡ After Exercise mg./100cc.	Reaction Before Exercise pH	Reaction After Exercise pH
1 (with oxygen)	96.6	98.7						
2	86.8	88.4	57.9	52.6				
2 (3 mo. later)	88.1	85.8	61.8	59.4	9.6	23.3	7.36	7.22
3	89.4	92.8						
F.S.*	78.3	73.4	54.2	50.6	12.4	21.5	7.40	7.32
J. A.†	93.1	94.3	54.3	51.6	8.0	17.5	7.40	7.40

*Not one of the presented cases: a severe case; the patient quickly became dyspneic and did less work than the others.
†Not one of the presented cases: a relatively mild case; less dyspnea was produced by twice as much work.
‡We are indebted to Dr. Elmer Stotz, of the McLean Hospital, Waverley, for these determinations.

One might outline the mechanism of dyspnea on mild exertion in these subjects thus: At rest they are ventilating at a somewhat lower level than that necessary to maintain normality of the alveolar air and blood but are adapted to this situation. (An abnormal Hering–Breuer reflex due to the altered elastic properties of the lung might well play a part in this abnormal ventilation.) When they exercise, even mildly, stimuli are set up that demand increased pulmonary ventilation. These stimuli may

be both nervous and chemical and may include afferent nervous stimuli from the active muscles, nervous stimuli from the higher centers, an abnormal rise in blood lactic acid and a change in the pH of the blood. Any increase in pulmonary ventilation, due to abnormal mechanical factors, can be accomplished only by great respiratory effort and to a very limited extent. Hence arise the limitation of exercise tolerance and the symptom of dyspnea.

Treatment of Emphysema

In a disease such as emphysema in which cure is impossible and therapy so limited, the importance of utilizing measures that produce even very minor benefit is obvious. These measures will now be discussed.

Relief of Bronchial Obstructive Factors

That patients with emphysema are not infrequently benefited by bronchodilator drugs has been noted by many observers [6,10] and has been illustrated in the cases here presented. The introduction of inhalation bronchodilator therapy by Lageder,[25] Graeser[26,27] and others was an important advance in the treatment not only of asthma but also of emphysema. Barach and his co-workers[8-10] have devised continuous vaporization methods, positive-pressure respiration and other measures of value in the treatment of these diseases. Of the many drugs credited with bronchodilator effect, the most generally effective is probably adrenalin; closely related drugs and ephedrine are also useful.[10] The desirability of any such form of bronchodilator therapy should be objectively tested in each case of emphysema by observing its effect on the maximum voluntary ventilation rate, the vital-capacity exhalation-time curve or the vital capacity (a much less significant measurement).

Oxygen Therapy

The advisability of oxygen therapy in Case 1, in spite of the pronounced anoxemia and marked anoxic symptoms, was questioned by some on the ground that it might prove impossible to discontinue such therapy again in such a severe and chronic illness. Oxygen therapy was instituted in this case discontinuously, using a B.L.B. oronasal mask at flow rates of 3.5 to 4.5 liters a minute in such a way as to ensure more adequate sleep, relief from continual respiratory distress and improvement in general well-being. It was found that a nasal mask that allowed the patient to receive oxygen while eating was valuable in preventing the usual rapid loss of appetite and nausea that otherwise occurred at mealtime. The complete effectiveness of such therapy in returning the arterial oxygen saturation to normal is shown in Table 4. With the combined use of oxygen and adrenalin nebula such improvement occurred in the patient's physical and physiologic condition that at the time of discharge from hospital his arterial oxygen saturation was 85 per cent.

Owing in part to the patient's indiscretions at home, it was soon found that oxygen would have to

Table 4. *Effect of Oxygen Therapy on the Oxygen Status of the Blood in Case 1.*

Condition	Oxygen Saturation	
	Arterial Blood %	Venous Blood %
Before oxygen therapy*	60.1	11.0
During oxygen therapy, at rest	96.6	65.0
During oxygen therapy, with mild exercise	98.7	—
After oxygen therapy (30 min. later)	71.7	46.5

*Done on a different day from the other measurements.

be made available in addition to the adrenalin and supportive medication that had been given. Arrangements were made with a commercial concern to keep the patient supplied with oxygen cylinders. The large cylinders of oxygen were delivered as required and connected for use at a cost of $3.06 per cylinder; the patient was supplied with an oronasal mask, reducing valve and flow meter at a total cost of $42 and instructed to use the oxygen sparingly but in such a way as to avoid excessive respiratory fatigue and to ensure adequate sleep at least every other night. He and his wife were thoroughly instructed in oxygen hazards. Follow-up at intervals of six weeks for a period of ten months showed a slowly progressive improvement in the patient's condition. His supplementary oxygen requirements dwindled from two and a half or three cylinders a week to one cylinder in two weeks. Adrenalin continued to be effective. At the time of the last visit the patient seemed to have much more energy than at any time previously. He could go up and down stairs for the first time in more than a year and could walk short distances each day. His color remained good, and his chest clear, and his ankles were free of edema. This therapeutic result was gratifying in view of the extremely grave prognosis at the time of admission to the hospital. This case seemed to illustrate forcibly the fact that in severe chronic pulmonary emphysema, if the vicious circle of respiratory fatigue, chronic anoxia, embarrassment of physiologic functions and general debility is broken, considerable improvement may be expected and maintained.

Abdominal Belts and Other Therapeutic Measures

In milder cases of emphysema and as supplementary measures in the severer cases, efforts to increase the mechanical efficiency of respiration by the use of abdominal belts of various types are reported by some to be attended by considerable success.[6,28] Our experience with them has not been sufficiently extensive to warrant any definite statement. The value of exhaling between closed lips,

and thus increasing the intrabronchial pressure as some patients do spontaneously, has been pointed out by Barach.[9] It seems reasonable to suppose, also, that deep breathing exercises should be of value in limbering up the costovertebral articulations, which tend to become fixed, thus making thoracic respiratory movements easier. In Case 1 such physiotherapy appeared to be beneficial.

Summary

Three contrasting cases of emphysema are presented that illustrate many features of the disease.

The usual method of measuring vital capacity is shown to be misleading owing to its neglect of the time factor. By kymographic vital-capacity recording the finding of severe limitation of exercise tolerance in the presence of a vital capacity of 4200 cc. is explained.

The importance of the bronchial obstructive element, when present, is stressed. The fact that marked bronchospasm may exist in the absence of all adventitious sounds in the chest adds to the importance of the adrenalin test. The value of adrenalin therapy as an inhaled nebula or as adrenalin in oil by injection is emphasized. An objective test of its efficiency should be made in each case.

Studies of the arterial blood and alveolar air in these and similar cases are the basis for discussion of the physiologic abnormalities that exist in this disease. These patients to some extent live at "high altitudes" at sea level. The anoxia that is found should be recognized as the cause of many symptoms in severe cases. Oxygen therapy is of value in preventing or breaking the vicious cycle of chronic anoxia, embarrassment of physiologic functions and respiratory fatigue, with resultant increase in general well-being and in exercise tolerance. Discontinuous oxygen therapy over a long period of time in the home is neither so difficult nor so costly as is generally believed and may be of utmost value.

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PANCREATIC LITHIASIS WITH ASSOCIATED INTESTINAL HEMORRHAGE*

Report of a Case

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PANCREATIC lithiasis is not so unusual a clinical and pathologic entity as was originally believed.[1] The complication of fatal intestinal hemorrhage, however, is distinctly infrequent, only 3 cases having been reported in the available literature.[2, 3] Therefore, the following case seems worth while presenting.

CASE REPORT

A. C., a 63-year-old man, had been treated 3 years previous to admission for a "fatty liver" ascribed to alcoholism. He was given a high-caloric diet and high vitamin intake and appeared to recover from this episode. He remained in relatively good health until 1 year before admission, at which time he began to suffer from diffuse, poorly localized abdominal pain that was intermittent. No radiation of this pain was noted, nor was there any back pain. During that period, there were alternating bouts of constipation and diarrhea of increasing severity. In the 6 months before hospitalization, the patient noted occasional tarry or blood-streaked stools. His appetite diminished and he experienced easy fatigability. There was a 20-pound weight loss in 1 year. Two days before entry he had a severe attack of diarrhea, the stools being bright red. On entry he was quite weak and dyspneic on exertion.

Physical examination was not remarkable. The outstanding finding was marked pallor of the skin. Examination of the abdomen was negative.

Throughout the hospitalization, the patient had multiple episodes of bleeding into the bowel, as evidenced by tarry stools and at times by bright-red fluid blood. The bleeding time, coagulation time, clot-retraction time, prothrombin time and platelet counts were within normal limits. A bromsulfalein function test of the liver was normal. Repeated barium enemas as well as x-ray examination of the gastrointestinal tract were not considered to be diagnostic. Sigmoidoscopy revealed fluid blood trickling down into sight, but no masses or other specific lesions could be made out.

Whereas usually the stools were positive for bile, for a period of 5 days there were clay-colored stools with no bile demonstrable. Urine examinations were at all times negative, no sugar being present.

In spite of repeated transfusions, the patient was considered a poor operative risk, and expired before a planned exploratory laparotomy could be performed.

Autopsy. The autopsy was limited to the abdomen. The major pathology was found in the second part of the duodenum. Just medial to the ampulla of Vater and at a slightly higher level there was an ulceration of the mucosa 4 mm. in diameter, from which protruded a fresh, friable blood clot. On its removal there was seen at the base of the ulceration a brownish-white, mulberry-shaped stone 3 mm. in diameter impinging on a small eroded blood vessel, the apparent source of hemorrhage (Fig. 1). On careful dissection, the ulceration was seen to represent the orifice of a sinus tract that, when traced into the pancreas, terminated in the duct formed by the union of the two major pancreatic ducts. This sinus tract was apparently formed by the inflammatory reaction evoked by the pancreatic calculi, which had caused erosion of the duodenal wall. Throughout the length of the pancreatic ducts there were numerous grayish-white, friable, granular calculi varying in size from tiny particles to masses 3 mm. in diameter. The ducts were markedly dilated, there being a cystlike dilatation just proximal to the ulceration through the duodenal wall. The margins of the dilated ducts were roughened and there was a definite fibrosis of the walls. The surrounding parenchyma showed a diffuse fibrosis with many small foci of calcification, possibly representing gravel in the small ducts.

The common bile duct was distended in its distal third, but no obstruction was demonstrable. The gall bladder was of normal size and free of calculi. The liver was enlarged and tawny yellow, and on section presented a slightly yellow surface. The remainder of the abdominal examination was not remarkable except for the presence of blood in the stomach and intestines.

FIGURE 1. *Photograph of the Ulceration in the Duodenum with the Pancreatic Calculus at Its Base* (x 2). *The probe is in the ampulla of Vater.*

The significant findings on microscopic examination were confined to the pancreas and liver. The pancreas revealed dilated ducts containing cellular débris. There was a marked interlobular and intralobular fibrosis, with infiltration by lymphocytes and macrophages and a reduction in the number of acini. The islets of Langerhans were uninvolved (Fig. 2). The liver showed marked fatty infiltration of the hepatic parenchyma.

The pathologic diagnoses were as follows: pancreatic lithiasis, with false-passage formation and ulceration through the duodenal mucosa and exsanguination from a bleeding vessel at the base of the ulcer, and fatty infiltration of the liver.

The intestinal hemorrhage markedly masked the symptomatology, making a clinical diagnosis impossible. Ideally, the radio-opaque calculi are demonstrable on x-ray examination of the abdomen. In this case, the calculi were not observed owing to

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the overlying shadows and possibly to the minimal amount of calcium present in these small calculi. It has been suggested that an x-ray photograph taken in the oblique position is ideal for delineating the calculi, since it eliminates the overlying obscuring shadows.[1]

Although in Nicolas's[2] case the duodenal hemorrhage was due to erosion of a blood vessel by abscess formation, in the present case a calculus mechanically eroded the blood vessel just as it had worked its way through the wall of the duodenum. There have been cases reported in which the calculi have ruptured into the abdominal cavity, and similarly one in which a fistulous tract was formed, extending from the pancreas to the umbilicus, with discharge of pancreatic calculi onto the skin surface.[3]

Thus, although the mechanism of hemorrhage as a complication seems understandable, the etiology of pancreatic calculi is extremely difficult to explain and has been the subject of numerous theories, none of which have been proved. It has been suggested that the stasis of pancreatic secretion is the causative factor, yet experimentally both pancreatic ducts in animals have been ligated without production of calculi. It has also been claimed that the backflow of bile into the pancreatic ducts may, by its irritative action, lead to calculus formation. Experiments in which bile was introduced into the main pancreatic duct, however, similarly failed to produce the lesion. Pasternack[4] has suggested that in cases of pancreatic lithiasis there may have been previous subclinical attacks of acute pancreatic necrosis, with resultant calcium deposition, which may serve as a focus or foci of further calcification and resultant formation of calculi.

The history of alcoholism appears to be of significance inasmuch as a review of the literature shows an association of this finding much more frequent than can be explained by pure chance. It is possible that a combination of several factors produces the above condition. Thus, at times stasis with regurgitation of bile due to gastrointestinal upset caused by alcoholism may initiate a chronic inflammatory reaction in the ducts, and calcium deposition then results, with the formation of calcium phosphate or carbonate stones. This may explain the presence of calcium, for although calcium is not a normal constituent of pancreatic secretion, it may be deposited in chronic inflammation.

In most cases of pancreatic lithiasis the ducts contain stones of varying size. These range from small gravel-like concretions to large stones, one having been reported as weighing 60 gm.[5] They vary in color from grayish white to yellowish brown, depending on their admixture with organic matter, and their consistence is determined by their calcium content. The walls of the ducts are usually thickened by a fibrotic reaction and are often rigid owing to calcium deposition. The ducts vary in caliber, tending to be dilated, and are tortuous, with oc-

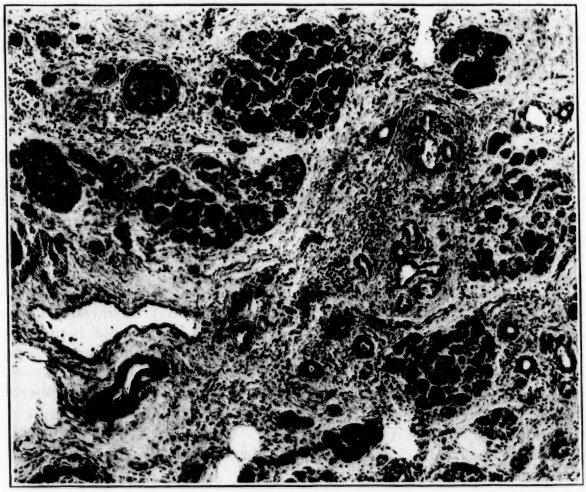

FIGURE 2. *Photomicrograph of the Pancreas (x 35).*
Note the marked fibrosis, the diminution in number of acini, the lymphocytic infiltration and the dilatation of the ducts.

casional areas of cystic sacculations corresponding to the location of the larger calculi.

The pancreatic parenchyma shows initially an interlobular fibrosis, subsequently developing into an interstitial fibrosis, with consequent replacement of the acini. Only in the later stages does a fibrotic replacement of the islets of Langerhans occur. Therefore, although diabetes mellitus is frequently associated with pancreatic lithiasis, it is not invariably found and, when present, occurs in the latter stages of the disease.

Snell and Comfort[1] in an excellent review of the subject have discussed the physiopathology and symptomatology in a highly enlightening fashion.

As a result of the extensive pancreatic fibrosis and consequent reduction in acini, there is a marked diminution in secretion of the various pancreatic enzymes. The lack of the fatty enzymes, steapsin and lipase, produces the steatorrhea that is so frequently seen. In the case presented above, the fatty nature of the diarrhea was undoubtedly obscured by the intestinal bleeding.

Owing to inadequate elaboration by the pancreas of lipocaic, the hormone functioning in the regulation of the proper deposition of fat in the liver parenchyma, this organ undergoes fatty infiltration and consequent enlargement. The hepatotoxic effect associated with alcoholism is an additional factor.

Abdominal pain is a frequent and a most prominent complaint. This pain is probably due to overdistention of the pancreatic ducts or to temporary spasm of the ampulla of Vater, with obstruction to biliary flow. In addition, there are profound reflex disturbances in the motor and secretory functions of the digestive tract, with consequent production of pain. The pain, however, is distinctly variable in type and location. It is usually intermittent, varying from severe colic to mild, evanescent abdominal distress. It may be confused with biliary colic, but more often it tends to a left-sided extension and may be further projected to the back to the left costovertebral angle and up between the shoulder blades. At times, the pain is excruciating and associated with nausea and vomiting. Thus, although pain is usually associated with pancreatic lithiasis, it by itself is not of great diagnostic aid owing to its great variability. In this case, the dull, diffuse, nonlocalizing abdominal pain, although in retrospect consistent with pancreatic lithiasis, was by itself in no way diagnostic.

By far the best diagnostic aid is x-ray examination. The finding of radio-opaque shadows along the axis of the pancreas extending to the left of the vertebral column is almost pathognomonic. To be sure, one must differentiate the shadows from those due to gallstones and renal calculi. At times, the calculi are not sufficiently opaque owing to a low calcium content, and in such cases the overlying loops of bowel may obscure the outline of these shadows.

In the absence of positive x-ray findings, the diagnosis of pancreatic lithiasis is a difficult one, because the symptomatology is so variable. The finding of some of the cardinal symptoms — abdominal pain, steatorrhea, hepatomegaly of unexplained etiology and occasionally diabetes mellitus — should, however, make one suspect this disorder and lead to investigation and possible confirmation.

Summary

A case of pancreatic lithiasis with sinus-tract formation and fatal intestinal hemorrhage due to erosion of a blood vessel is presented. The theories of pancreatic calculus formation and symptomatology are discussed. The importance of x-ray examination as a diagnostic aid is emphasized.

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Correction. In the article "Treatment of Meningococcic Meningitis with Penicillin" by Drs. Manson Meads, H. William Harris, Bernardo A. Samper and Maxwell Finland, which appeared in the October 12 issue of the *Journal*, the second and third sentences in the section "*Tests for Sensitivity of Strains*" on page 512 should be changed to read as follows: "One strain was completely inhibited by 0.36 units per cubic centimeter, 3 by 0.18 units, and 1 by 0.09 units. The first was obtained from Case 7; the organism obtained after eleven days of penicillin therapy in the same case was also tested and showed an increase in resistance, 0.71 units per cubic centimeter being required to inhibit completely its growth."

MEDICAL PROGRESS

THE TREATMENT OF GOUT*

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IN A previous article[1] of this series gout was defined as a hereditary constitutional disease, preeminently of males, occurring at any age and in most cases characterized by recurrent attacks of acute arthritis, caused by deposits of sodium urate crystals. Gout may be manifested only by an asymptomatic hyperuricemia[2–4] that, throughout the life of the patient, may remain the only sign of the disease. Such asymptomatic hyperuricemia, although rarely demonstrated, probably always antedates the first attack of arthritis. Once the hyperuricemia is established it persists throughout life regardless of the incidence or degree of joint involvement. Treatment of gout, in order to be specific, should therefore be based on the knowledge not only of the cause of hyperuricemia but also of the factors that, once hyperuricemia is established, lead to the precipitation of urates in articular and other tissues.

The factors that lead to hyperuricemia in gout have not been fully explained. Theoretically, the elevation in the blood uric acid level may be the result of decreased destruction, increased formation or decreased elimination of uric acid. Since, however, evidence is entirely lacking that uricolysis ever occurs in human beings, the hyperuricemia cannot be ascribed to the first-named mechanism. If it were due to enhanced uric acid formation, a relatively greater excretion would be demonstrable in all patients, as is the case with glucose in diabetes. If, on the other hand, the hyperuricemia were the result of impaired renal function, the uric acid excretion would be decreased, a finding actually observed by many workers. Most gouty subjects when kept on a low-purine diet excrete less than 500 mg. a day, the average being lower than that found in normal persons.[5, 6] A few cases of increased uric acid excretion are on record,[5, 7] however, and have led certain workers to postulate that an augmented production of uric acid is responsible for the hyperuricemia of gout.[7] Although no explanation can be given for these rare cases, it seems reasonable to accept the mass of evidence showing that the daily uric acid excretion of gouty subjects is not increased. It therefore appears that the intermediary purine metabolism of the gouty patient is normal and that his hyperuricemia is accounted for by a limitation of renal excretion of uric acid that is the end product of purine metabolism.

Hyperuricemia, although an essential feature of gout, cannot be regarded as the sole cause of urate deposition in tissues and arthritis in gout. This is apparent from the following well-established observations. First, hyperuricemia as a result of renal disease or increased formation of uric acid, such as occurs in leukemia and other conditions that lead to an increased breakdown of nuclear tissue, does not cause gouty arthritis except possibly in patients who already have gout as evidenced by the history of preceding attacks or a positive family history. Second, the serum urate concentration does not reflect the severity of the gouty arthritis. It is well known that a patient may have extreme hyperuricemia although clinically the disease is mild; conversely, in some patients with severe disease the serum uric acid concentration hardly exceeds the normal value. In a given patient with gout there is no correlation between clinical symptoms and the fluctuations in urate concentration in the serum. Occasionally patients are seen who have their severest attacks at times when the urate concentration is at its lowest, whereas they may remain asymptomatic at periods when it is high.

The fact that an elevation of urate concentration alone does not necessarily cause precipitation is explained by the strong tendency of sodium urate to remain in supersaturated solution. According to the best available data,[8] a serum with normal sodium and hydrogen-ion concentrations is supersaturated if the urate concentration exceeds 6.5 mg. per 100 cc. This level must be regarded as an approximation of the true solubility and may have to be revised in the future. Precipitation of sodium urate is a physical impossibility unless the body fluids are supersaturated. Clinical experience that gouty attacks occur only in patients whose serum uric acid concentration is elevated§ indicates that the solubility figure given above is approximately correct.

It appears likely, therefore, that the serum of gouty patients is supersaturated in regard to sodium urate. The physicochemical factors that initiate precipitation under these conditions are entirely

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§It should be remembered that even the best methods[9,10] for the determination of uric acid are subject to a variety of errors that can be eliminated only by meticulous care and frequent checks. Determinations on whole blood yield lower values than do those on serum. It is possible that the rare exceptions to the above statement are explained by inadequacies of the method.

unknown. The fact, however, that in supersaturated solutions the formation of precipitate is largely independent of the concentration explains the lack of correlation between the serum uric acid level and the incidence of attacks in gout. Whether attacks are possible if the urate concentration of the body fluids falls below the level of 6.5 mg. cannot be decided so long as the magnitude of the true solubility remains uncertain.

It is therefore evident that serum uric acid determination cannot be used as a measure of the therapeutic efficacy of any regimen and that treatment can be evaluated only on a clinical basis. An important reason for the disagreement about the value of various therapeutic measures lies in the extreme variability of the clinical course of gout. It is well known that patients who have been bedridden for months because of rapidly recurring attacks of great severity often, without any known cause, go into periods of complete freedom from joint pain that in some cases last for years. On the other hand, patients are not infrequently seen who, after having had only rare attacks, spontaneously and without any change in regimen lapse into a state of chronic, crippling disease. The nature of the gouty attack is equally unpredictable. Although typically accompanied by extreme pain and all signs of acute inflammation of the involved joint, it may be evidenced only by pain lasting for a short time without any objective signs. The pain and swelling may subside suddenly during the first day or may last for days or weeks, or the attack may even lead to chronic deformity of a joint. Since it is impossible to account for the variations in the natural course of the disease, it is obvious that evaluation of any treatment, whether directed toward prevention of attacks or toward alleviation of the acute symptoms, is extremely difficult. It is owing to this difficulty that in the past many different and contradictory methods of treatment have been proposed.

Treatment of Acute Attack

The treatment of the acute attacks of gouty arthritis is satisfactory. Colchicum, obtained from the seeds of *Colchicum autumnale* (fall crocus), was first recommended by Alexander of Tralles (525–605) and, as colchicine, remains the drug of choice. Its mode of action in gout is unknown beyond the fact that it does not affect the hyperuricemia or the renal excretion of uric acid. We have seldom seen it fail to bring relief when given properly during the first few hours of an acute attack. When administration is delayed, the effect is less certain, but an attempt to shorten an attack by administration of colchicine is advisable at any stage of the disease. It has fallen into disrepute in times past, undoubtedly owing to the use of impure or impotent preparations in the form of wine or tincture. Therapeutic failures can often be avoided if the drug is always administered as crystalline colchicine. The preliminary use of a saline cathartic is recommended by some.[11]

We prescribe 0.5 mg. every hour or 1 mg. every two hours, until relief from pain is obtained or until diarrhea or nausea and vomiting result, when the drug is discontinued. Provided the patient is kept at bed rest, pain and swelling usually subside within twenty-four to seventy-two hours after the first loose bowel movement. Rarely do the articular symptoms disappear sooner. The ensuing diarrhea is frequently severe enough to require treatment with paregoric; 4 cc. is given following each loose stool until the diarrhea is checked. Bismuth subcarbonate may be used instead of or in conjunction with the paregoric. Once the amount of colchicine necessary to produce such symptoms has been established in a patient, the total dose may be reduced by one or two tablets (0.5 or 1.0 mg.) to avoid severe gastrointestinal symptoms without curtailing the desired effect. The total amount required to alleviate the acute attack varies from 4 to 8 mg. of colchicine and rarely exceeds this quantity.

We have never observed any other untoward effects from crystalline colchicine. Hypersensitivity to the drug is unknown, nor does it lose its efficacy with repeated administrations. The patient should always carry colchicine. The appearance of any prodromal symptoms or the first twinges of articular pain call for immediate institution of therapy. If these rules are followed, the patient will be spared many prolonged and incapacitating seizures. Some workers unwisely object to the side action of colchicine and delay therapy until the attack has fully developed.

We can find no indications for the use of cinchophen and substances closely related to it, either alone or in conjunction with colchicine. To be sure, the risk attendant on their administration — primarily that of acute liver necrosis — is statistically small, but minor symptoms of toxicity are a more frequent annoyance to the patient and serve as warning signals for immediate cessation of therapy. In omitting these drugs, we are guided by the fact that colchicine, when given properly, is not only entirely safe but also much more effective. Morphine or codeine may be needed to ensure comfort before the colchicine effect is secured. At the time of the seizure, no dietary measures other than those given for any painful illness of short duration are required. Patients rarely desire anything more than liquids and soft foods, and a daily fluid intake of 3000 to 4000 cc. should be encouraged.

Absolute bed rest is always indicated for the duration of the attack, whether or not weight-bearing joints are involved. Premature resumption of normal activity not infrequently precipitates an exacerbation. Avoidance of even normal joint use prevents minor trauma, thereby shortening the period of incapacitation. Protection of the affected part by a cradle eliminates the pressure from bed-

clothing and lessens the chance of accidental jolting. Hot compresses every three hours are a useful adjunct, although an occasional patient derives greater relief from cold packs. Moist heat is always preferable to dry heat. Diathermy as a rule is not tolerated well.

Interval Treatment

Ideally, the treatment of gouty subjects between acute attacks should be aimed at the prevention of the attacks and of complications. In accordance with a widely disseminated belief that adherence to a rigorous purine-free diet reduces or eliminates acute seizures and sufficiently alters the course of the disease to prevent chronic arthritis and the complications of gout, countless gouty patients have been subjected to undue and sometimes serious nutritional restrictions. Although it is well established that such a regimen slightly reduces the serum uric acid level, a careful survey of the past and current literature reveals the astonishing fact that conclusive evidence pertaining to the effect of dietary restriction of purine intake on clinical gout is entirely lacking. Talbott[12] observed no effect on the frequency or severity of the acute attacks in a group of patients maintained on a carefully measured low-purine diet. Likewise, we have seen no therapeutic effect from a low-purine diet or any increase in symptoms when patients who had followed such a rigorous regimen returned to a normal, well-balanced diet.

The conspicuous failure of the low-purine diet to control the recurrence of acute attacks of gout has in no way diminished the search for a dietary means of control of the disease. Extensive trials of a diet almost entirely devoid of fat have been conducted. This mode of treatment was initiated because of the following observations. In 1924, Lennox,[13] found a significant increase of serum urate concentration in starving subjects whose caloric requirements were met by their own adipose tissue. Harding et al.[14] were able to reproduce these changes by feeding excessive amounts of fat to healthy persons. Subsequently Lockie and Hubbard[15] apparently precipitated attacks in gouty patients by excessive feeding of fat and therefore advocated a diet low in fat as a preventive measure. A strictly fat-free diet forms part of the regimen that has been advocated recently by Bartels.[16] At the present time there is no agreement about the value of this diet. According to our experience gouty attacks cannot be precipitated with any regularity by a high-fat intake, nor is the amount of fat contained in a well-balanced diet sufficient to cause significant retention of uric acid.[17] Furthermore, in our experience the omission of fat from the diet has not proved beneficial.

Unqualified abstinence from alcoholic beverages is almost uniformly advocated, and some clinicians consider the ingestion of alcohol the most important of all precipitating factors. We have not, however, been able to provoke attacks experimentally by administration of large quantities of liquor. Despite complete abstinence, a large number of patients continue to suffer from repeated gouty attacks. In a previous article we[1] have quoted specific cases that serve to emphasize that the instrumentality of alcohol in precipitating gouty arthritis is unproved.

In outlining a regimen for gouty patients we are guided by the following considerations. The diet should be balanced and should contain adequate amounts of protein, iron and vitamins. Since circulatory complications are frequent in gout, obesity should by all means be avoided. Drastic curtailment of purine intake is inadvisable because it can be accomplished only by a diet composed of a small variety of vegetables and cereals, eggs and dairy products. Such a diet is not only highly monotonous and unpalatable but, if followed for a prolonged period, is likely to lead to serious deficiency states. Few patients are willing to adhere strictly to such a regimen. Moreover, a reasonably low purine intake can easily be accomplished if only the few foods that are listed in Table 1 are omitted from the diet. This restriction offers no hardship to the patient, but there is no pertinent evidence that the number and severity of acute seizures is thereby reduced. However, since in most cases of gout the elimination of uric acid is diminished, it appears unreasonable to introduce unnecessary amounts of purines. It is possible that the omission of the few foods mentioned retards the growth of tophi, which occasionally in the late stages of the disease form the chief cause of the patient's disability.

Table 1. *Purine Content of Certain Foods.*

Food	Purine Content mg./100 gm.
Sweetbreads	825
Anchovies	360
Sardines	300
Liver	230
Kidneys	200
Brains	195
Meat extracts	150

Cinchophen has been extensively employed in the interval treatment of gouty arthritis. Its use is advocated in doses of 0.5 gm. three times daily. As precautionary measures against toxic effects a daily fluid intake of 2000 cc., a high-carbohydrate diet and maintenance of an alkaline urine are usually recommended. There is no doubt that cinchophen does cause a temporary increase in urate excretion and so lowers the blood urate level, but because of its toxicity, and since precisely the same results can be achieved without fear of complications by the use of salicylates, we believe that cinchophen should never be employed in the treatment of gout.

Salicylate is the only safe drug known that causes efficient elimination of urates. In the past acetyl-

salicylic acid (aspirin) has been recommended in doses of 5 to 6 gm. on three consecutive days of each week.[18] Figure 1 demonstrates the changes in the serum level and excretion of uric acid that take place on this regimen. During the seven days

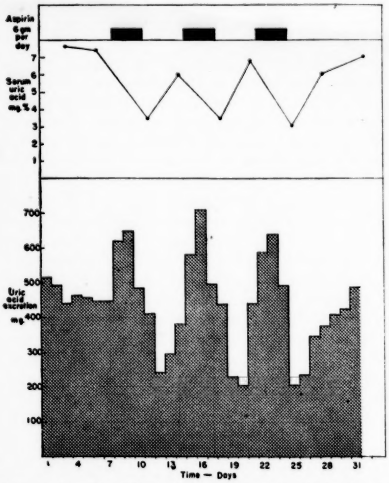

FIGURE 1. *The Effect of Intermittent Acetylsalicylic Acid Medication on the Serum Uric Acid Level and the Uric Acid Excretion.*

preceding administration of salicylates the average daily uric acid excretion amounted to 466 mg. During the twenty-four-day period of intermittent administration of salicylates the average was 433 mg. It is apparent that, although marked urate diuresis was caused by the administration of acetylsalicylic acid, a corresponding amount of urate was retained during the immediately ensuing period, with the result that the total amount of urate excreted was not significantly altered by this regimen. The serum urate level likewise underwent fluctuations and reached high levels on the days when no salicylate was given. After a few months of such treatment tolerance is developed and the serum uric acid becomes stabilized at its usual level.

Salicylates are effective in promoting the excretion of uric acid only when given in large amounts. They are ineffective in doses of less than 4 gm. a day, and we[19] have seen actual retention of uric acid with marked increase in the serum concentration when doses of 1 to 2 gm. were given. Striking reduction of the serum urate concentration is observed when salicylates are given in continuous daily doses of 5 to 6 gm. Under these conditions a lowering of the blood urate level to one third its original level is frequently observed. Figure 2 illustrates the typical changes that occurred in a patient treated with continuous daily doses of 5 gm. of acetylsalicylic acid. It is evident, however, that the reduction of the serum urate concentration is temporary, and a gradual return to the original level usually occurs within about three months.

Clinical observation has proved that it is impossible to prevent attacks of gouty arthritis by continuous administration of salicylates. This is not surprising in view of the fact that it is impossible to maintain the serum uric acid permanently below the critical level of about 6.5 mg. Therefore, we advise neither continuous nor intermittent administration as a routine procedure. On the other hand, in a number of patients studied while in a state of rapidly recurring attacks we have not observed the recurrence of new joint symptoms during the first few weeks of treatment with massive doses of acetylsalicylic acid. Only more extensive studies will enable us to decide whether in these patients the cessation of attacks was caused by the administration of salicylates or whether we were dealing with the natural remissions that occur so frequently in the course of gouty arthritis. These studies, although inconclusive as to the therapeutic value of salicylates, demonstrate clearly that, without any inherent risk, results can be obtained by their use that equal those ascribed to cinchophen. Gastrointestinal symptoms, occasionally encountered after

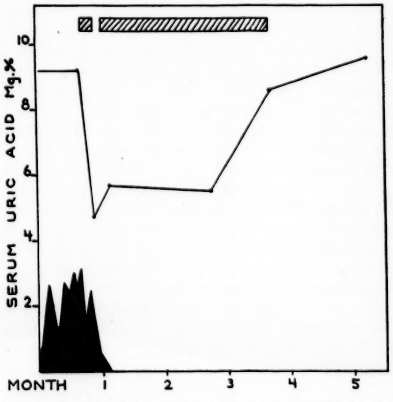

FIGURE 2. *The Effect of Continuous Acetylsalicylic Acid Medication on the Serum Uric Acid Concentration.*

The shaded area represents the administration of 5 gm. of acetylsalicylic acid daily. The black area signifies the incidence of attacks of gouty arthritis.

large doses of acetylsalicylic acid, can easily be controlled by the administration of equal amounts of sodium bicarbonate. There is no justification for

giving large doses of salicylates continuously except in patients who have lapsed into a state of rapidly recurring attacks of gouty arthritis.

Some authors[20, 21] advise the giving of 10 gm. of glycine daily for three days of each week in conjunction with salicylates as another means of augmenting the output of urates. We have never employed this combination, but our experience with glycine alone has been disappointing. We have seen no beneficial effects from the administration of thiamine chloride. The administration of small daily doses of colchicine (1 mg.) in the interval, as suggested by some,[12] although harmless, has had no preventive value.

The injection of purified uricase, prepared from pig's liver, has recently been attempted by Oppenheimer and Kunkel.[22] These authors were unable to demonstrate any action of the injected enzyme on the uric acid concentration in the blood of men.

Chronic gouty arthritis is least amenable to treatment of any form of the disease. In this stage, acute attacks are relatively infrequent and mild. The patient's disability and pain are due primarily to the permanent joint changes that have been caused by the preceding acute attacks. Some of our patients feel certain that the giving of 0.5 mg. of colchicine three times a day provides a measure of relief. Regular rations of salicylates are often necessary for the control of pain. Active or passive exercise should be prescribed whenever possible to prevent increasing limitation of the involved joints, but severe pain may make immobilization of a joint imperative. In selected cases, operative correction of joint deformities has yielded fair results. Application of foot pads or special shoes may be indicated. Troublesome tophi can usually be excised without precipitating an attack of gout.[23] We know of no special benefit derived from spa therapy.

The cardiovascular disease and vascular nephritis that so frequently complicate gout are not preventable and must be treated according to the specific needs of the patient. The unexplained high incidence of urinary calculi in gouty subjects, amounting to 12 per cent in Hench's[24] series, can probably be reduced if a liberal daily fluid intake (3000 cc.) is encouraged in all patients. Alkalinization of the urine by the daily administration of 8 to 16 gm. of sodium citrate is advised in those patients who are known to have formed uric acid stones. It is not recommended as a routine procedure because calcium phosphate stones are known to have occurred in association with gout.[17]

Summary

Gout, which is a hereditary disorder, cannot be prevented or cured. Interval treatment with diet, drugs or a combination of both as advocated to date has been disappointing. After a careful survey of personal results and a review of the literature, it is concluded that there is no pertinent evidence that these measures alter the clinical course of the disease or even lessen the incidence of attacks. The treatment of the acute attack is highly satisfactory, colchicine being the drug of choice.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

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CASE 30461

PRESENTATION OF CASE

First admission. A sixty-seven-year-old cook entered the hospital because of abdominal swelling.

The patient was essentially well until one year before entry, when he developed orthopnea, exertional and nocturnal dyspnea, which had increased in severity, especially during the month before entry. Three or four weeks before entry he developed a cough productive of a small amount of white sputum. Six days prior to admission, swelling of the abdomen and ankles appeared and progressed to the point where he was unable to work.

The past history was essentially negative except for the imbibition of two or three glassfuls of beer and occasional drinks of whisky daily for twenty years and, before that, two or three pints of beer and about a gallon of wine daily for some years.

Physical examination showed an obese, slightly cyanotic, orthopneic and dyspneic man. The anteroposterior diameter of the chest was increased, and its expansion limited. Breath sounds were diminished toward both bases, more so on the right, with a few crackling and moist rales. Loud wheezes and rhonchi were heard throughout the chest on inspiration and to a less degree on expiration, persisting after cough. The heart was moderately enlarged, with the apex 4 cm. beyond the midclavicular line. The rate was regular. There was no pulse deficit. A loud, grating "meat slicer" murmur was heard over the precordium, loudest over the aortic area, and was transmitted to the neck vessels. No diastolic murmurs were audible. The aortic second sound was greater than the pulmonic. The abdomen was distended, with a fluid wave and shifting dullness. The edge of the liver extended 10 cm. below the costal margin and was slightly tender. There was moderate scrotal edema. The prostate was diffusely enlarged and firm. There was slight pitting edema of the legs.

The blood pressure was 135 systolic, 75 diastolic. The temperature was 100°F., the pulse 80, and the respirations 25.

*On leave of absence.

Examination of the blood showed a red-cell count of 5,540,000, with 95 per cent hemoglobin, and a white-cell count of 7250, with 61 per cent neutrophils. The urine gave a + test for albumin and, after the first day, a green or olive reaction with Benedict's reagent. A blood Hinton test was negative. An electrocardiogram revealed auricular flutter, with four-to-one block, the ventricular rate being 75, and the auricular 300. The axis was normal, T_1 inverted, T_2 and T_3 upright, and T_4 low but upright. An x-ray film showed marked enlargement of the heart in the region of the left ventricle. The right border was also prominent. The transverse diameter was 17.2 cm., and the internal diameter 32.2 cm. In the left oblique view an area of calcification was seen in the region of the aortic valve. The hilar shadows were prominent, but the vascular markings were only slightly increased. There was no fluid in the pleural cavities. A plain film of the abdomen showed moderate enlargement of the liver. The lower border extended about 8 cm. below the costal margin laterally.

The patient was given 0.3 gm. (4½ gr.) of digitalis daily for six days, — thereafter, 0.1 gm. daily, — 1 gm. of ammonium chloride three times a day and occasional intravenous injections of Mercupurin. The fluid intake was limited to 1500 cc. He failed to show any spectacular diuresis at first, but the edema gradually decreased. The orthopnea and dyspnea became much less. On the eleventh hospital day, the fasting blood sugar was 210 mg. per 100 cc., the nonprotein nitrogen 32.5 mg., and the protein 7.7 gm., with an albumin-globulin ratio of 1.4. A cephalin-flocculation test was +++ in twenty-four hours and ++++ in forty-eight hours. A bromsulfalein test gave 70 per cent retention.

A urine examination on the day of discovery of high blood-sugar level revealed an orange reaction for sugar and a ++ test for acetone. He was given a high carbohydrate diet, and the diabetes was controlled with insulin. An electrocardiogram on the twelfth hospital day revealed conversion of the auricular tachycardia to fibrillation. The patient improved for a few days, but with increased fluid intake the output decreased and there was recurrence of the edema, which was then treated by limitation of the fluid intake and diuretics. On the thirtieth hospital day, however, he had ascites and moderate pitting edema of the ankles. The liver edge was felt 8 cm. below the costal margin. The heart rate was slow (40) but regular.

He improved some in the next six days and was discharged home on 0.1 gm. of digitalis daily, 1 gm. of ammonium chloride three times a day, a high-vitamin diet and provision for the control of the diabetes.

Final admission (two months later). After discharge the patient was followed in the Out Patient Department, where he was given occasional intra-

venous injections of Mercupurin. On one occasion, 3500 cc. of deep-straw-colored ascitic fluid, with a specific gravity of 1.018, was withdrawn, with marked relief. During the first month the heart rate was 60, with frequent bigeminy. Although the patient claimed that he followed the regimen prescribed for him, the fluid reaccumulated and he became increasingly dyspneic and orthopneic and felt extremely weak and tired. He was admitted to the hospital.

Physical examination showed marked edema of the legs, moderate respiratory distress, but no cyanosis. The neck veins were distended. The margins and tip of the tongue were smooth. Breath sounds were depressed over both bases, more so on the right, with absent tactile fremitus and evidence of fullness. The heart was regular but slow, and the sounds were distant and of poor quality. There was a Grade III systolic murmur, which masked the first sound over the entire precordium. The abdomen was markedly distended. The liver edge was ballotable six fingerbreadths below the costal margin. The spleen was enlarged but not palpable. The lower extremities showed moderate pitting edema, which gradually diminished to slight at the umbilical region.

The blood pressure was 140 systolic, 70 diastolic. The temperature was 99.4°F., the pulse 40, and the respirations 22.

Examination of the blood showed a red-cell count of 3,900,000, with 12.5 gm. of hemoglobin, and a white-cell count of 10,050, with 69 per cent neutrophils. The urine gave a ++ test for albumin and was negative for sugar. The stools were guaiac negative. The venous pressure was 16 mm. An electrocardiogram showed auricular fibrillation, with a rate of 55. The axis was normal. There were a few premature ventricular beats. T_1 was flat or slightly inverted, ST_2 depressed, T_2 low, and T_3 and T_4 flat. The fasting blood sugar was 102 mg. per 100 cc., the nonprotein nitrogen 22.5 mg., and the protein 7.5 gm. An x-ray film of the chest showed a large amount of fluid in the right pleural cavity, extending to the level of the eighth rib in the midaxillary line. Some increase in the vascular markings was apparent throughout both lungs. The left costophrenic angle was hazy.

The patient was kept on essentially the same program of therapy as previously. On the third day he had a profuse epistaxis, which stopped spontaneously. On the fifth day, 3000 cc. of straw-colored fluid was withdrawn from the abdomen. There was temporary improvement, but his condition became progressively worse and he died on the eighth hospital day.

Differential Diagnosis

Dr. Conger Williams: In summary, this is the case of a sixty-seven-year-old man who came in with a history of progressive dyspnea and edema and died two months later in a state of considerable fluid retention, in spite of fairly intensive therapy directed against it. It seems obvious that there are three main features. One is heart disease; another is the question of liver disease; and the third is diabetes, which we know that he had. Can all these findings be explained on a diagnosis of heart disease alone, and if so, what was the etiology? I believe that I can answer the first question but not the second.

It seems to me that, from the evidence at hand, all the findings described here cannot be explained by a diagnosis of heart disease alone. One of the greatest discrepancies is the finding of a venous pressure of 16 mm. (just above normal), with ascites and edema of the feet and ankles and so forth. Another feature that is a little unusual for heart disease alone is the appearance of ascites, presumably before the ankle edema. At any rate, when the patient first came in, ankle edema was slight and ascites quite well marked. That may be seen in cases in which the venous pressure is high, as in constrictive pericarditis or tricuspid disease, but in the ordinary course of congestive heart failure, especially that progressing from the left to the right side of the heart, such a sequence of events is unusual. The liver size too seems out of proportion to the venous pressure if one can credit the one measurement. Although this was taken at a time when the signs of fluid retention were quite marked, very likely we have another complication to consider. At this point I should like to ask the radiologist whether or not he thinks that the heart shadow was particularly enlarged.

Dr. Laurence L. Robbins: Without much question in this film, which apparently was taken at the time of the first admission, the heart shows definite left ventricular enlargement. The area of calcification that is described in the note I presume is this area here, which is perfectly consistent with calcification in the aortic valve. One cannot say from the films alone that it was definitely within the heart, but it probably remained within the heart during fluoroscopy. These films, taken some three months later, are consistent with congestive failure.

Dr. Williams: Do you think that the heart shadow is large?

Dr. Robbins: There is slight to moderate enlargement.

Dr. Williams: That may be an important point in making a decision about the underlying disease. It seems to me that the heart shadow should have been larger if this much fluid retention resulted from heart disease alone. Of course in a young person one should always think of mitral stenosis, with or without tricuspid disease, to account for an apparently predominant right-sided heart failure. In an elderly patient, such a diagnosis is possible but much less likely, and in this case I shall have

to throw it out. The necessary murmurs are not present, and the x-ray findings do not suggest mitral disease. High-grade tricuspid disease is hardly ever seen in the absence of mitral disease, except in rare congenital cases. It seems fairly obvious that there was some involvement of the heart. We have cardiac enlargement and a definite systolic murmur to back up that supposition, and the electrocardiographic changes are also indicative of heart disease, especially in the presence of significant arrhythmia, both flutter and fibrillation.

What is the etiology of the cardiac lesion? The murmur suggests aortic stenosis. Calcareous aortic stenosis usually occurs at this patient's age. Apparently the aortic second sound was heard, as it may be even in the presence of a fairly high degree of aortic stenosis. If an attempt is made to explain this whole picture on that basis, I should be happier about not hearing an aortic second sound, because the degree of aortic stenosis would need to be great, unless there was a complicating disease of the myocardium in addition. Coronary heart disease is a good possibility, yet one would not expect to find extensive myocardial involvement in the absence of previous infarction. Certainly from the history and the electrocardiogram there is no evidence that such an episode had ever taken place. So I cannot say much about the etiology of the heart disease, beyond saying that I think the patient probably had aortic stenosis.

How about liver disease? First of all, he had a good and a prolonged alcoholic history, and the laboratory tests are in keeping with the diagnosis of cirrhosis. The high grade of bromsulfalein retention and the positive cephalin-flocculation test, in the absence of any evidence of biliary obstruction, are certainly in favor of a diagnosis of cirrhosis. The liver size is also in keeping, and I think that I can explain the ascites better by assuming that the patient had a complicating liver disease. One often hears the clinical statement to the effect that when ascites develops in cirrhosis the liver must be small, but that is not always so.

How about other possible causes of the edema? We know that the serum protein, at least the total protein, was normal throughout. The albumin-globulin ratio was never more than slightly abnormal. Could the patient have had an obstruction of the inferior vena cava? There is no evidence of such an episode, and it would not explain the liver enlargement.

There is one other disease that must be considered, namely, hemochromatosis. This man presumably had liver disease, probably cirrhosis, in the presence of mild diabetes and cardiac involvement, with enlargement of the heart and at least some cardiac failure. To my knowledge hemochromatosis is almost never seen without pigmentation of the skin, but in one of these conferences anything can happen. I should like to ask Dr. Castleman if any statement was made about skin pigmentation.

DR. BENJAMIN CASTLEMAN: No.

DR. WILLIAMS: In this stage of the disease one would almost certainly expect to see pigmentation of the skin. I just mention hemochromatosis as a possibility. It may produce destructive myocardial lesions as a reaction to the presence of pigment deposited in the heart muscle.

My final diagnoses are aortic stenosis, probably calcareous, cardiac enlargement, congestive heart failure, alcoholic cirrhosis of the liver, diabetes mellitus and, possibly, hemochromatosis.

DR. JOSEPH C. AUB: The quantity of ammonium chloride given was small (3 gm.) for the amount of edema. Maybe it was not effective so far as diuresis was concerned. Also, I do not believe that fluid in the chest rules out the possibility of cirrhosis. A good many of our cirrhotic patients have fluid in the right side of the chest. I do not know why.

DR. WILLIAMS: I meant to mention the fact that the presence of fluid in the chest is not against heart failure or cirrhosis.

A PHYSICIAN: Would there be any retention in fluid?

DR. WILLIAMS: Yes, more or less retention.

DR. PAUL D. WHITE: As I remember the story there seemed to have been hardly enough dyspnea to explain chronic left-sided, followed by chronic right-sided, heart failure. Is that true?

DR. WILLIAMS: He had dyspnea for a year. It is not described in great detail. I do not know whether it was present all the time.

DR. WHITE: To have cardiac cirrhosis one must have a lesion resulting in marked right-sided heart failure, which usually follows an extremely chronic degree of left-sided heart failure. Since that was not striking in this case, cardiac cirrhosis would seem less likely than alcoholic cirrhosis.

DR. WILLIAMS: I think constrictive pericarditis can be ruled out by the electrocardiogram as well as by the venous pressure.

CLINICAL DIAGNOSES

Calcareous aortic stenosis.
Cardiac hypertrophy.
Portal cirrhosis of liver.
Diabetes mellitus.

DR. WILLIAMS'S DIAGNOSES

Aortic stenosis (calcareous).
Cardiac enlargement.
Congestive failure.
Cirrhosis of the liver (alcoholic).
Diabetes mellitus.
Hemochromatosis?

ANATOMICAL DIAGNOSES

Rheumatic heart disease.
Endocarditis, chronic, rheumatic, of mitral and aortic valves.

Calcareous aortic stenosis.
Cardiac hypertrophy and dilatation.
Pulmonary congestion and edema.
Hydrothorax, right.
Ascites.
Peripheral edema, moderate.
Chronic passive congestion.
Cirrhosis of liver, cardiac, slight.
Chronic thyroiditis (Riedel's struma).

Pathological Discussion

Dr. Castleman: The autopsy on this man showed an enlarged heart, weighing 550 gm. There was no disease of the tricuspid or pulmonary valves.

We found 500 cc. of straw-colored fluid in the abdomen and 1000 cc. in the right chest. The lungs showed congestion and some edema. The liver was enlarged, weighing a little under 2000 gm., and in gross showed little if any evidence of cirrhosis, perhaps a fine granularity but certainly not a portal cirrhosis. There was distention of the central veins grossly, and microscopically there was dilatation of all the sinusoids, with narrowing of the liver cords and a little cellular infiltration in places (Fig. 2), a picture characteristic of a fairly severe

Figure 1. *Photograph of the Heart.*
Note the calcareous stenosis, as well as the shortening and thickening of the chordae tendineae of the aortic leaflet of the mitral valve.

There was rheumatic involvement of the mitral valve but not enough to produce a severe stenosis. The chordae tendineae were shortened and thickened, and the leaflets themselves were fibrotic. The aortic valve also showed rheumatic involvement (Fig. 1). There was interadherence of the cusps of the aortic valve for a distance of almost 1 cm. from their commissures. In addition there were calcareous masses on the aortic side of the valve in and above the sinuses of Valsalva and also on the endocardial side of the valve. So we have an aortic calcareous stenosis, definitely rheumatic this time, to account for the enlarged left ventricle. degree of chronic passive congestion. There were scattered foci of early fibrosis, and I believe that there is sufficient evidence for a diagnosis of early cardiac cirrhosis. It is quite unusual to have this much cirrhosis with the first attack of heart failure. Cardiac cirrhosis usually occurs only after two or three attacks, whereas this patient, at least from the history, had had just one.

Dr. White: He may have had more prolonged disease than we know about.

Dr. Castleman: Another interesting finding in view of the diabetes was a severe chronic thyroiditis

of the Riedel struma type. There must have been little activity of the thyroid gland. With severe thyroid impairment one would ordinarily expect a low blood sugar rather than diabetes. Is that not so, Dr. Aub?

DR. AUB: The fasting blood sugar ought to be normal. The sugar curve might be abnormal in hypothyroid disease. Hyperthyroidism has a blood-sugar curve reminiscent of diabetes, but it starts off with a normal blood-sugar level.

DR. HOWARD B. SPRAGUE: Do you believe that the alcoholic history had anything to do with making the liver hypersensitive to chronic passive congestion?

DR. CASTLEMAN: I do not believe so, because if there was any evidence of alcoholism in the liver we should have seen a fatty change with perhaps hyaline granules in some of the liver cells or a little portal cirrhosis. We found nothing to suggest it.

DR. WHITE: If a patient has had enough congestion, I suppose that he might have impairment of function that would resemble primary liver disease.

DR. WILLIAMS: One point that might have settled the thing from the beginning would have been an accurate observation on the state of the neck veins. A good clinical observation of neck veins is almost as good as direct measurement of the venous pressure. Often there is an early increase in venous pressure. A statement is made in the history, but the observation was made later. I wonder whether the degree of congestion was out of proportion to the size of the heart. There seems to have been a terrific amount of congestion for a moderately enlarged heart.

A PHYSICIAN: How would you distinguish between cardiac cirrhosis and portal cirrhosis at the bedside? In reading this history I could not differentiate, but with the liver findings and with aortic stenosis of rheumatic origin I thought that he must have had cardiac cirrhosis, because on referring to Dr. White's* book I find the statement, "Cirrhosis of the liver due to heart disease, although infrequent, is most commonly noted in those who have had chronic or recurrent congestive failure secondary to rheumatic heart disease."

DR. WHITE: I think this is a case in point in which we cannot distinguish clinically. Although Dr. Castleman found no alcoholic cirrhosis, alcoholism may possibly have been something of a factor in preparing the field for the cirrhotic change when his heart finally failed.

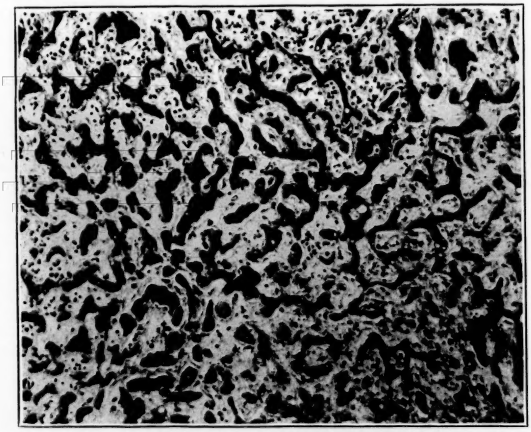

FIGURE 2. *Photomicrograph of the Liver.*

DR. SPRAGUE: Of the hundreds of cardiac cases that we see here, we encounter this picture only rarely.

A PHYSICIAN: What about the spleen?

DR. CASTLEMAN: It was not enlarged, weighing about 200 gm. It certainly could not have been felt and probably could not have been shown by x-ray to be enlarged.

A PHYSICIAN: Would the finding of esophageal varices have helped?

DR. CASTLEMAN: Yes; that would be a differentiating point between portal and alcoholic cirrhosis. They apparently were not observed.

DR. REED HARWOOD: Was there coronary sclerosis or evidence of disease in the myocardium?

DR. CASTLEMAN: There was slight narrowing of the coronary arteries, but no evidence of scarring of the myocardium.

*White, P. D. *Heart Disease*. Third edition. 1025 pp. New York: Macmillan Company, 1944. P. 557.

CASE 30462

Presentation of Case

A seventy-one-year-old housewife was admitted to the hospital for study.

For many years the patient had had intermittent abdominal pain. Fifteen years before entry, following an attack of cholecystitis, a cholecystectomy and probably a choledochostomy were done, with considerable immediate relief. She continued, however, to have intermittent attacks of vomiting and epigastric pain associated occasionally with dark urine and once with jaundice for a day. Four months prior to admission she began to have bouts of crampy epigastric pain on getting up in the morning, so that she was forced to go back to bed for several hours. These occurred about once a week. In the next two months the pain increased in severity but never radiated to the back or to the shoulder. There was occasional vomiting of bile-stained material. She gradually became distended. Three weeks before admission she entered a hospital in another city. A gastrointestinal series taken there was said to have shown a diaphragmatic hernia. Plain films of the abdomen showed gas in the large intestine. There was some improvement in the abdominal pain, but she was referred here for further study. She had been constipated for years, and there had recently been no change in the stools.

Physical examination showed a well-nourished, slightly pale woman in no discomfort. The heart was not enlarged. Apical and aortic (Grade I) systolic murmurs were heard. The lungs were clear, except for occasional squeaks. The abdomen was distended. Peristalsis was active and of normal pitch. In the epigastrium there was tenderness to deep pressure, but no masses were palpable. The lower extremities were edematous up to the lower thigh.

The blood pressure was 125 systolic, 80 diastolic. The temperature was 98.6°F., the pulse 75, and the respirations 20.

The white-cell count was 9100, with 12 gm. of hemoglobin. The nonprotein nitrogen was normal, and the serum protein 5.8 gm. The specific gravity of the urine was 1.010; it showed a + test for albumin, and the sediment contained 30 white cells and 3 red cells per high-power field. A blood Hinton test was negative. A van den Bergh test was too low to read. Plain films of the abdomen showed a considerable amount of gas in the colon and a moderate amount in the epigastric region, probably in the stomach; no definitely dilated loops of small bowel were visible.

The patient was given daily intravenous fluids. A Miller–Abbott tube was passed with some difficulty to the ligament of Treitz. The following day about 15 cc. of barium was injected through the tube, which by that time was in the lower ileum, and filled a nondilated loop. Peristalsis was not active, however, and the barium did not pass along the bowel during the short period of fluoroscopy. A film taken one hour later showed the barium in the cecum. No dilated loops of small intestine were visible. A twenty-four-hour film showed all the barium in the right side of the colon. No evidence of intestinal obstruction was seen.

The patient continued to have abdominal discomfort and vomited everything she ate. On the fifth hospital day an operation was performed.

Differential Diagnosis

Dr. Edward Hamlin, Jr.: We are asked to discuss a case of crampy epigastric pain, vomiting and abdominal distention in an elderly woman with an old history of gall-bladder disease whose physical examination was essentially normal except for edematous legs. If there is a clue about what part of her anatomy was at fault, I fail to find it, and the laboratory work offers no help. Perhaps the attempt to fill the small intestine with barium indicates that the clinicians' chief interest was in the small bowel. One must assume that they knew more about her than we do, for I am certain that I should not operate on anyone with the facts at hand. Assuming, then, that something was at fault with the small intestine, — the location of pain and persistent vomiting tend to bear that out, — what should we consider?

The story suggests that she did not have obstruction, but rather impediment to the passage of intestinal contents. A band or adhesion is statistically the likeliest cause of this.

We know that the patient had had an operation on the gall bladder. Adhesions of the duodenum to the gall-bladder bed with angulation are not at all infrequent, but the clinicians appear not to have been interested in that region, since they injected barium into the lower ileum. Certainly an adhesion of the small intestine below the duodenum to the gall-bladder bed is unusual. What else could have been at fault? Tumors of the small bowel occur and may have obstruction as their first symptom. Practically any type of tumor could be considered and not ruled out. Furthermore, interference to the circulation of the bowel at this patient's age is not rare.

Mesenteric venous thrombosis is a possibility, and it could perhaps best explain the apparent atony of the small bowel observed under the fluoroscope. A four-month history, however, is unusual for this condition. We are told that the pain at no time radiated to the back, which is unlikely when the mesentery is involved. A complication of a Meckel's diverticulum might be considered. It seems pointless to continue with a catalogue of all the minor possibilities that can and probably should be thought of in connection with this patient.

Since a diagnosis is asked for, I shall say that this patient had venous thrombosis of a segment of mesentery of the small bowel, probably in the lower jejunum or upper ileum, which was not sufficient to cause necrosis of the bowel but which did prevent normal peristalsis and so produced the symptoms.

Clinical Diagnosis

Postoperative adhesions.

Dr. Hamlin's Diagnosis

Mesenteric venous thrombosis.

Anatomical Diagnosis

Carcinoma of pancreas, with peritoneal metastases.

Pathological Discussion

Dr. Benjamin Castleman: As Dr. Hamlin has indicated, the available clinical data on this patient were extremely meager, but the case does bring up the question of a differential diagnosis of atony of the small bowel with abnormal peristalsis. Dr. Hamlin chose venous thrombosis; the surgeon in charge of the patient inclined toward adhesions caused by the previous gall-bladder operation. Another cause of disturbed peristalsis is carcinomatous infiltration of the visceral peritoneum of the small bowel, and that is what this patient had. There were numerous small tumor nodules over the small bowel, one of which was biopsied and proved to be adenocarcinoma. The primary tumor was a baseball-sized mass in the head of the pancreas. A liter of ascitic fluid was aspirated before the abdomen was closed.

We have since heard that the patient died five months later.

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ONE FREEDOM

A young infantryman, writing from the Italian front last winter, gave his views on the problem of the promised freedoms. The four freedoms, according to this concept, can be included in the one freedom — freedom of thought in its broadest sense. He wrote: "The other three are subsidiaries. . . . Freedom of religion is but a phase of direct thought. Want and fear are curses which can be lifted only by 'right thinking.' . . . Freedom of thought should be interpreted in a very positive light — the 'necessity for true thought,' and it should imply the upward step from freedom-to-think-as-you-please to the compulsion to seek out the truth."

This foxhole philosophy arose out of a soldiers' discussion of war ideals and issues; it does its bit toward making us believe that the soldier, too, realizes his stake in the war and the peace, and sees no advantage in risking his own life in combat unless some considerable portion of the human race is going to benefit by his sacrifice. Under the circumstances there is something either stupid or sinister in the recent legislative attempt to deny political information to the soldier after giving him the vote; to deny him, in other words, that very freedom of thought for which he had been given to understand that he is fighting.

Freedom of thought and its more concrete ramifications, such as freedom of speech, freedom of the press and freedom to worship, are actually highly elusive qualities that must be wooed and fought for and cherished, over and over again. No ruler, however altruistic, however freedom-loving in principle, can hold power long without putting restrictions for others on the very freedom that he professes to love so well. A subversive tendency is being shown in our own government, where, it is said, various department workers are forbidden to question department policies, unless they care to run the risk of losing their jobs. Freedom of thought cannot be tolerated, apparently, on a one-track road, and no desire for the truth, however burning, can be permitted to interfere with departmental expediency.

Everywhere, on a desperately contested battle front, we are fighting to protect our basic freedom against assaults from without. We must not forget, however, that the "compulsion to seek out the truth" must be constantly protected from those who would seek to destroy it from within — even from some who, with apparent sincerity, give it their daily blessing.

GLOBAL EPIDEMIOLOGY

Perhaps nothing is a better illustration of the intricacies and all-inclusiveness of modern medicine than one of many problems that faced the Preventive Medicine Service of the Office of The Surgeon General prior to and after the entry of the United States in World War II. This particular problem concerned the assembling, evaluation and dissemination of data regarding medical, health and sanitary conditions for all localities in which military

forces might be stationed. Because of the global character of the conflict it soon became apparent that information should be available for every corner of the world, varying from Arctic regions to the tropics, from arid deserts to humid jungles and from areas with adequate public-health control to those in which such facilities were lacking, indeed in which the dangers of disease were much greater than those of combat.

The Medical Intelligence Division of the Preventive Medicine Service was established in June, 1941, to handle the problem, and this division, to which two officers were originally assigned, has now grown to comprise eleven officers, five civilians of professional grade and a clerical staff of fifteen. Surveys covering one hundred and ninety areas have been prepared. The data included are as follows: geography and climate; public health, including health services, water supplies, sewage disposal, insects and animals, poisonous plants and foods, food and dairy products, and miscellaneous problems of sanitation; medical facilities, including hospitals, medical personnel and medical institutions; diseases, arranged according to mode of spread; a summary; and a bibliography. The enormity of the task of assembling these facts is apparent, particularly since many of them could be obtained only from obscure sources or by personal interviews. Equally clear is their value not only to the military forces but also to those interested in the broad aspects of preventive medicine, and the publication of these surveys, necessarily with the deletion of matters of military significance, should be enthusiastically welcomed.

The first volume of *Global Epidemiology** consists of two parts: the first includes India and the Far East, and the second, the Pacific area. The listed authors, Brigadier General J. S. Stevens, chief of the Preventive Medicine Service, Office of The Surgeon General, United States Army, Lieutenant Colonel T. F. Whayne, Lieutenant Colonel G. W. Anderson and Major H. M. Hadock, are naturally those who have been largely responsible for the conception and completion of the undertaking.

With the appearance of the three subsequent volumes, which will cover surveys of countries and areas in Africa, Europe, the Near East and the Western Hemisphere, data will be available that should be of incalculable value in the period of global trade and rapid transportation that is certain to follow the termination of war.

MASSACHUSETTS MEDICAL SOCIETY

DEATHS

BRUCE — Daniel A. Bruce, M.D., of Quincy, died November 5. He was in his eighty-second year.

Dr. Bruce received his degree from McGill University Medical School, Montreal, in 1892. He was a member of the staff of Quincy Hospital for many years, and was a former president of the Norfolk South District Medical Society.

TRASK — Harry W. Trask, M.D., of West Boylston, died November 5. He was in his sixty-fourth year.

Dr. Trask received his degree from the University of Vermont College of Medicine in 1904. He was chief obstetrician at Holden Hospital and school physician in West Boylston many years. He was a member of the American Medical Association.

BOOK REVIEWS

Rehabilitation of the War Injured: A symposium. Edited by William B. Doherty, M.D., and Dagobert D. Runes, Ph.D. 8°, cloth, 684 pp., with 229 illustrations and 17 diagrams. New York: Philosophical Library, Inc., 1943. $10.00.

Is it possible to make a treatise by bringing together fifty-one essays culled from nineteen current periodicals and two books, American, British and Russian, without delineating the respective fields to be covered and utterly without editorial streamlining? This book does not give an affirmative answer. It contains articles of widely different method and merit, which unfortunately often overlap and equally often leave gaping hiatuses.

The first section, comprising ten essays on neurology and psychiatry, is much the best, as would be expected from the distinction of some of its authors. The section on reconstructive and plastic surgery would be inadequate as an aid to the surgeon confronted by these problems. Several of the topics, such as harelip and cleft palate, have no relation to war injuries, and others are frankly in the field of the beauty parlor rather than that of the military general hospital. In the section devoted to orthopedics, the articles on amputations and limb fitting are useful, but one on leg lengthening seems hardly germane, and the transplantation of the great toe to replace the thumb, "with restoration of all forms of sensibility," by the incredible Russians seems of dubious practical value. Several articles on the organization and administration of rehabilitation centers among the British may prove useful. The next section, consisting of fourteen contributions on occupational therapy and vocational guidance, is marred by the inclusion of much scarcely relevant matter, such as that concerning civilian pulmonary tuberculosis in England. Perhaps the most timely contribution is the last, entitled "Vascular and Neurologic Lesions in Survivors of Shipwreck."

The volume is well printed and bound, but it is impossible to speak so favorably of the illustrations, most of which are miserably reproduced, and many of whose labels can scarcely be deciphered with the aid of a magnifying glass. Furthermore, the proofreading could have been done with more care.

It seems to the reviewer that, although there are many excellent and informative passages in this book, the seeker for guidance in most of the problems that it treats but does not cover will be obliged to turn to other sources.

*Simmons, J. S., Whayne, T. F., Anderson, G. W., and Hadock, H. M. *Global Epidemiology: A geography of disease and sanitation.* Vol. I. 504 pp. Philadelphia: J. B. Lippincott Company, 1944.

A Hundred Years of Medicine. By C. D. Haagensen, M.D., and Wyndham E. B. Lloyd. 8°, cloth, 444 pp., with 42 illustrations. New York: Sheridan House, 1943. $3.75.

This is an impressively instructive book for the beginning medical student, as well as for the layman. It is absorbing reading and reflects the judicious attitude of the authors in their effort to trace important medical advances from their origin rather than attempting to survey the whole field of medicine in strict chronological order. Dr. Haagensen, surgeon and pathologist at Columbia University School of Medicine, and Dr. Lloyd, a specialist in public health in England, deal with their material under four sections.

The first section provides the reader with an insight into the state of knowledge that existed a hundred years ago, by discussing briefly the origin of medicine, the theories of medicine in the eighteenth century, the state of hospitals, the sanitary conditions, and the organization and education of the medical profession. The second section, covering medical science during the last hundred years, presents a keen analysis of the germ theory and progress in chemotherapy, vitamin therapy and in knowledge concerning tuberculosis, pernicious anemia, diabetes, diseases of the heart and nephritis. The third section, dealing with surgery during the last hundred years, begins with a discussion of McDowell's ovariotomy and goes on to consider topics such as anesthesia, the conquest of surgical infection, surgical shock, obstetrics and gynecology, orthopedics, neurosurgery, thoracic surgery and radium therapy. The fourth section, concerning the new social aspects of medicine, points out the significance of the ageing of the population since the turn of the century. The authors come to the paradoxical conclusion that although the nineteenth century was one of phenomenal medical progress, the conquests of the diseases of youth that were achieved have left us with health problems even more difficult than those before, — both from the medical and the economic point of view, — namely, the degenerative group of diseases of advancing age, such as heart disease, cancer, cerebral hemorrhage and nephritis. In the final chapter, "The Doctor's Dilemma," the question is raised how best to utilize the vast modern armamentarium of medical knowledge for the benefit of society, and in seeking an answer to this question the authors deal with the challenges offered by the reform in medical education, specialization, the costs of medical care and medical-insurance systems, both abroad and in America. There are forty-two excellent illustrations, a useful bibliography and a good index.

This book should be read by all medical students who wish to gain an appreciation of the facts of disease to which they can attach their fundamental knowledge of anatomy, physiology, pathology and biochemistry. The authors deserve congratulations on an admirable work for the benefit of the layman and the medical profession.

Microscopic Technique in Biology and Medicine. By E. V. Cowdry, Ph.D. 8°, cloth, 206 pp. Baltimore: The Williams & Wilkins Company, 1943. $4.00.

The purpose of this extraordinarily useful book is "to extend the horizon by exposing in an introductory way a few of the many opportunities awaiting workers in biology and medicine interested in the minute structure of living things." The author, well known as a brilliant scientist, devotes ten pages to a succinct, profitable discussion of choice of methods, as a kind of menu. There follow a few pages on the organization of the laboratory and the standardization of stains. Then, in alphabetical order, come a list of stains, technics, chemical procedures, apparatus and numerous other valuable items, all briefly discussed and carrying easily available bibliographic references. This book should be a *sine qua non* on the shelves of all medical libraries; its value can only be proved by its constant use.

Blood Supply of the Visual Pathway: A monograph. By Calvin M. Kershner, M.D., M.S. (ophth.). 8°, cloth, 160 pp., with 33 illustrations. Boston: Meador Publishing Company, 1943. $3.00.

This small monograph attempts to gather together in one place in a systematic manner many of the essential facts displayed in a wide literature, analyzing and correlating the pertinent information most valuable to the ophthalmologist. The book is divided into two parts; the first covers the general arterial supply and venous drainage, and the second deals with the detailed blood supply and venous drainage of each section of the visual pathway.

There is little about the illustrations to commend them, and the book loses greatly in value from the fact that the author did not include an index.

Human Constitution in Clinical Medicine. By George Draper, M.D., C. W. Dupertuis, Ph.D., and J. L. Caughey, Jr., M.D. 8°, cloth, 273 pp., with 29 illustrations and 30 tables. New York: Paul B. Hoeber, Incorporated, 1944. $4.00.

Twenty years ago Dr. Draper wrote a book *Human Constitution.* His idea was to apply to clinical medicine the technics of measurement used by anthropologists and in this fashion to study as scientifically as possible the relation of human morphology to disease.

He drew some interesting conclusions from his preliminary work. He thought that certain types of people were likely to develop certain types of disease: the person likely to have gallstones, for instance, was measurably separable from the one likely to develop gastric or duodenal ulcer. He acknowledged that he was describing only the commencement of a program of investigation that he expected to elaborate and stated that eventually he hoped to correlate anthropometric studies on sick people with their physiologic, immunologic and psychologic reactions to such diseases as they were compelled to endure.

This new book is written in collaboration with two other authors, but is in reality an extension of the first. Here, Dr. Draper lays less stress on the methods of measurement employed and much more on psychology. He describes a number of patients constitutionally liable to develop the diseases they proved to have, and through them he attempts to defend further the idea expressed in the first volume, namely, that disease potentially may be a secondary sex characteristic since persons suffering with diseases most commonly encountered in the opposite sex often show constitutional variations approaching the norms for the opposite sex. He carries along his argument ingeniously and graphically. Throughout all his discussion he lays great emphasis on the need in clinical practice for the doctor always to understand how his patients feel and what sort of human beings they are.

The new book was written largely for the benefit of medical students. They will find it readable and stimulating. More mature clinicians will find much in it that is worth while. For underneath a camouflage of newly coined words is repeated a medical truism attributed to old Dr. Parry, of Bath, which, no matter how it is disguised, continues as significant as when it was first propounded: "It is just as important to know what sort of patient has a disease as to know what sort of disease the patient has."

Health and Hygiene: A comprehensive study of disease prevention and health promotion. By Lloyd Ackerman, Ph.D. 8°, cloth, 895 pp., with 59 illustrations and 27 tables. Lancaster, Pennsylvania: The Jaques Cattell Press, 1943. $5.00.

The author has attempted to provide a book on disease prevention and health promotion "that will appeal to mature, inquiring minds in all circles: nonscholastic as well as scholastic, lay as well as professional, and legal, political, engineering, social service, journalistic, pedagogical and religious as well as medical." This is necessarily a most difficult accomplishment, and it is doubtful whether all these groups will be interested in his efforts. The bibliography is excellent and extensive. The physician might well be interested in this if not in the text. A perusal of the index shows that many diverse phases of medical science are discussed, ranging from the life work of Mary Baker Eddy to penicillin. Some subjects are discussed in detail, others are rapidly reviewed. Diabetes is covered by ten lines, the cancer problem by thirteen pages, and mental hygiene by one hundred and forty-five pages. There is much that could be considered controversial in the work, which makes it challenging

to the interested reader, but those desiring information on certain subjects will be disturbed after reading all sides of the given question to find no solution to the problem. It is definitely not for a casual reader, and although written in an interesting style, the arrangement is such that it requires frequent skipping from one part of the book to another in order to clarify a subject. Public health has largely been omitted. This is so intimately connected with personal hygiene that one would question the omission.

The book is divided into ten sections as follows: "Introduction," "The Evolution of Health Concepts and Health Practices," "The Evaluation and Importance of Health Concepts and Health Practices," "Parasitism and Hypersensitiveness," "Hygiene of the Mouth," "The Hygiene of Nutrition," "Hygiene of the Emotions and the Intellect," "The Hygiene of Mating," "Exogenous Poisons" and "Physical Agents and Their Relations to Health."

Some might wonder why cancer was included under "exogenous poisons," whereas others would question the advisability of including the results of surveys on sex practices in a volume that in the preface is tentatively suggested as a textbook.

NOTICES

SUFFOLK DISTRICT MEDICAL SOCIETY

The fall dinner of the Suffolk District Medical Society will be held on Saturday, November 18, at the Harvard Club of Boston, 374 Commonwealth Avenue, Boston. A social hour beginning at 6:00 p.m. will be followed by dinner in Harvard Hall at 7:15. His Excellency, Leverett Saltonstall, will speak on the topic, "Medical Social Security," and Dr. Rogert I. Lee on "Health Insurance??"

It is urged that doctors bring their wives and particularly that the wives of all doctors absent in the service, whether or not the doctor is a member of Suffolk Society, be invited by members as their guests. Each member who sends to the treasurer with his own application the names of such service wives will receive free tickets for them. The tickets, $3.00 each, must be purchased in advance by sending cash or a check to the treasurer, Dr. Richard S. Eustis, 319 Longwood Avenue, Boston 15. Other members of the Massachusetts Medical Society may apply.

SOUTH END MEDICAL CLUB

A regular meeting of the South End Medical Club will be held at the headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, on Tuesday, November 21, at 12 noon. Dr. William P. Murphy will speak on the subject "Vitamins."

Physicians are cordially invited to attend.

NEW ENGLAND HEART ASSOCIATION

The next meeting of the New England Heart Association will be held on Monday, November 20, at 8:15 p.m., at the Boston Medical Library.

The entire program will be devoted to a symposium "Treatment of Subacute Bacterial Endocarditis with Penicillin."

PROGRAM

Experience at the New Haven Hospital. Drs. Jessamine Goerner and Arthur Geiger.

Experience at the Massachusetts General Hospital. Drs. Marion W. Mathews and Paul D. White.

Experience at the Peter Bent Brigham Hospital. Drs. Cutting B. Favour, Charles Janeway, John G. Gibson and Samuel A. Levine.

Experience at the Boston City Hospital. Dr. Maxwell Finland and associates.

Experience at the House of the Good Samaritan. Drs. Benedict F. Massell and Mary Meyeserian.

Discussion. Dr. Chester S. Keefer.

NEW ENGLAND ROENTGEN RAY SOCIETY

The next meeting of the New England Roentgen Ray Society will be held at the Harvard Club on Friday, November 17. There will be an x-ray conference at 4:30 p.m. At 8:00 p.m. the following program will be presented:

Pulmonary Infarction.
Roentgenologic Appearance. Dr. Laurence L. Robbins.
Clinical Features and Treatment. Dr. Robert R. Linton.
Intrapulmonary Lymphatic Spread of Metastatic Carcinoma.
Roentgenologic Appearance. Dr. H. Peter Mueller.
Pathology. Dr. Ronald C. Sniffen.

NEW ENGLAND OBSTETRICAL AND GYNECOLOGICAL SOCIETY

The sixteenth annual meeting of the New England Obstetrical and Gynecological Society will be held at the Harvard Club of Boston on Wednesday, December 6.

AUSTEN RIGGS FOUNDATION

The Austen Riggs Foundation Medical Advisory Board is commemorating the twenty-fifth anniversary of its hospital by holding the annual meeting this year at the Academy of Medicine in New York City on Wednesday, November 22, at 3:30 p.m. Dr. Lawrence S. Kubie will present a paper on the problems of brief psychotherapy and the training of therapists, particularly the role of the small sanitarium and hospital in such a program. A discussion will follow by Brigadier Rees, of London, the Salmon Lecturer, Major General Chisholm, of Ottawa, and others.

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY

The next written examination and review of case histories (Part I) for candidates will be held in various cities of the United States and Canada and by special arrangements at Army and Navy stations on Saturday, February 3, 1945, at 2:00 p.m. Candidates who successfully complete the Part I examination proceed automatically to the Part II examination held later in the year. All applications for this year's examinations must be in the office of the secretary by November 15, 1944.

Arrangements will be made, so far as is possible, for candidates in military service to take the Part I examination (written paper and submission of case records) at their places of duty, the written examination to be proctored by the commanding officer (medical) or by a medical officer designated by him. Material for the written examination will be sent to the proctor several weeks in advance of the examination date. Candidates in military service who wish to do so may send their case records in advance of the examination date to the office of the secretary. All other candidates should present their case records to the examiner at the time and place of taking the written examination.

The Office of The Surgeon-General of the United States Army has issued instructions that men in service eligible for Board examinations be encouraged to apply and that they may be ordered to detached duty for the purpose of taking these examinations whenever possible. The Office of The Surgeon-General of the United States Navy presumably takes a similar attitude on this matter.

The place of the Board's Part II examination in May or June, 1945, has not yet been decided, but it is likely to be held in that city nearest to the largest group of candidates. The exact time and place will be announced later.

If a candidate in service finds it impossible to proceed with the examinations of the Board, so that his plans are thus interrupted, deferment of parts of these without time penalty will be granted under a waiver of the published regulations covering civilian candidates.

For further information and application blanks, address Dr. Paul Titus, Secretary, 1015 Highland Building, Pittsburgh 6, Pennsylvania.

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